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ABSTRACT

This instructional unit for the second grade is intended to stimulate the child's curiosity to know more and to grasp relationships through a blending of ideas about energy with a study of the effect of the use of energy on the livelihood of people in the community. There are four lessons in the unit. The first, Introduction to Energy, deals with the question, "What is energy and energy conservation?" The second lesson, Community Workers Who Work Directly With the Sources of Energy, discusses farmers, grocers, food processors, oil workers, gas station attendants, and meter readers. The third lesson is entitled Community Workers Whose Work Depends on a Continual Supply of Energy. The fourth lesson is Community Workers Who Make Decisions About Energy. Each lesson contains complete teacher and student materials including background readings, objectives, teaching strategies, and suggestions for extending the learning outside the classroom. (BB)

U.S. Department of Energy

National Science Teachers Association

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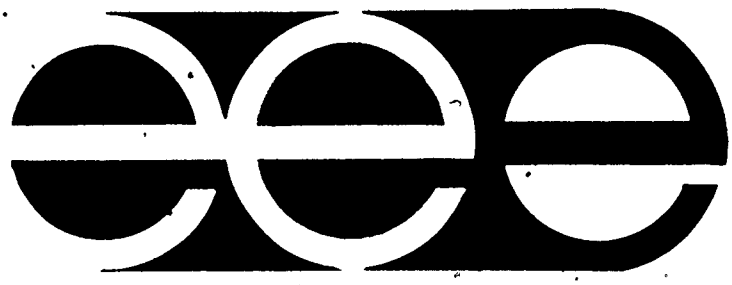

Interdisciplinary Student/Teacher Materials in Energy, the Environment, and the Economy

5

Community Workers and the Energy They Use

Grade 2

This material was produced by the National Science Teachers Association under contract with the U.S. Energy Research and Development Administration (now U.S. Department of Energy). The facts, statistics, and conclusions are those of the authors.

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5
Community Workers and the Energy They Use
Grade 2

National Science Teachers Association
1742 Connecticut Avenue, N.W.
Washington, D.C. 20009

This instructional unit was produced by NSTA's Project for an Energy-Enriched Curriculum under contract #EX-76C-10-3841 from the Education Programs Branch, Office of Public Affairs, the U.S. Energy Research and Development Administration (now U.S. Department of Energy). The NSTA project staff is as follows:

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"Community Workers and the Energy They Use" is the product of a writing session held at the University of Maryland during Summer 1976. The following teachers were the main contributors to this unit:

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The PEEC staff also wishes to acknowledge the cooperation of the National Council for the Social Studies (NCSS) and its Executive Director, Brian Larkin. The NCSS has suggested teachers and consultants to us and has assisted in evaluation and review of the social studies aspects of this unit.

Finally, we wish to acknowledge the support and cooperation of Bart McGarry, Assistant Director for Public Services, Office of Public Affairs, Energy Research and Development Administration (ERDA), and especially of Donald Duggan, Chief, Education Programs Branch, Office of Public Affairs, ERDA, and Program Manager of the PEEC contract, who had actively and enthusiastically contributed advice and counsel on many phases of this materials development effort.

October 1977
John M. Fowler
Project Director

Community Workers and the Energy They Use

Introduction

At the second grade level, social studies education concentrates on the community as a place for living and learning, where all members must work together if the community is to meet its problems and improve its services. Such education develops awareness of work as something good, familiarizing children with some of the different kinds of work people do, and helping them to understand how these different jobs contribute to the enrichment of life in the community. Specific jobs in the energy field are used as a basis for developing such awareness.

What do young children learn in science in second grade? An examination of the contents of their pockets or what they are holding in their hands can tell a great deal. Perhaps there is a pink quartz rock, a dogwood leaf, an acorn or two, a couple of rubber bands, or a robin's feather. To the adult scientist these things represent some of the main areas of knowledge: geology, botany, physics, and biology. While children do not deal in such advanced levels of science, they are beginning their study of science with zestful curiosity of the living and nonliving things around them. The next step is to introduce children to some of the important things which they can't see. Energy provides a good example. Children can't see it, but they can see and feel its effects in heat, light, and motion. The activities in this packet are intended to stimulate the child's curiosity to know more and to grasp relationships through a blending of ideas about energy with a study of the effect of the use of energy on the livelihood of people in the community.

To show how energy influences the patterns of our daily lives we have classified some of the community workers under three headings.

The time allotments for this packet have been suggested, but they may vary depending on (1) the abilities of the students, (2) whether the unit is to be used in its entirety, or (3) integrated within an existing community helpers unit.

Each lesson contains complete teacher and student materials including background readings, objectives, teaching strategies, and suggestions for extending the learning outside the classroom.

I. Introduction to Energy

What is Energy?
Energy Conservation

II. Community Workers Who Work Directly With the Sources of Energy

Farmer
Grocer
Food Processor
Oil Man
Gasoline Station Attendant
Meter Reader

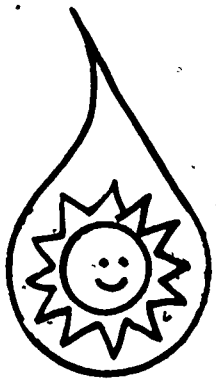
III. Community Workers Whose Work Depends on a Continual Supply of Energy

Transportation Worker: Truck Driver
Electrician
Telephone Linesman, Installer, and Repairman

IV. Community Workers Who Make Decisions about Energy

Local Government Officials

I. Introduction to Energy



1. What is Energy?

Overview

This lesson will provide, in part, an opportunity to explore the forms of energy: light, heat, and motion.

Objectives

Students should be able to:

1. Verbalize energy as having the capacity to move, heat, and light things.
2. Draw pictures and use them to explain how energy is being used.

Materials

Toy car or toy truck

Background Information (Teacher use only)

This lesson shows how energy is a term that can be defined in many ways. Perhaps the best definition is that energy can heat, light, and move things. When energy is used to create heat, light, or motion it is called kinetic energy. When it is stored - in coal or food for example - it is called potential energy. There is potential energy in fossil fuels, in a battery, or in water in a reservoir above a dam. As much as possible, allow children to discuss these differences, but direct the lesson toward the way we use energy.

Teaching Strategies

A good way to open the lesson is to hold up a toy truck (or car) so that the class can see it. Ask: How can I get this truck (car) across the room? What do I have inside me that gives me the strength to push the truck? What do my muscles need to give me strength? Can we call this body energy?

Develop the lesson by writing the word energy on the chalkboard. Allow plenty of time for children to look at the word. Ask: What things do you do that use energy? If the suggestions bog down, suggest some everyday classroom things: sharpening a pencil, riding a bike to school, using the seesaw on the playground, etc.

Let the children try to guess some of the ways energy is used in the classroom, other than body energy. You might show them energy being used when you switch on a light, or coming from the heating source such as the radiator. Review energy as having the ability to move things by having the children look out the window to see cars and people moving.

For fun, as well as for the experience of working with the three forms of energy, in an atmosphere of getting along together, have the children draw pictures of energy moving things, heating and lighting things. Have children compare their pictures, sharing ideas for writing sentences that could go under each picture. Use the pictures and sentences as an informal evaluation.

2. Energy Conservation

Overview

This lesson develops the children's understanding of conservation as meaning to use wisely. It focuses on some of the ways energy can be saved.

Objectives

Students should be able to:

1. Define the word conserve as meaning to use wisely.
2. Investigate different conservation practices to become more aware of the need to conserve our natural resources.
3. State how people take action to conserve valuable resources.

Materials

Conservation picture book
A conservation picture, suitable for thermofaxing into a ditto master from which class copies can be made.

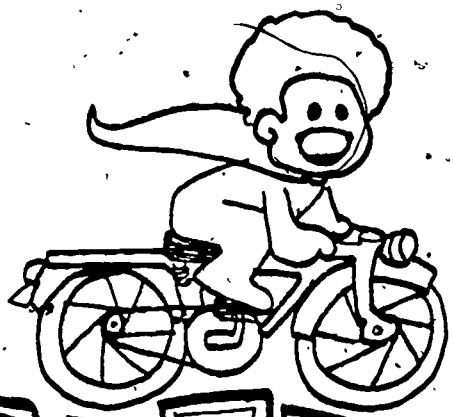
Background Information (Teacher use only).

By conserving energy today, we are helping to insure that we will have enough for the years ahead. The oil embargo crisis of 1973-74 brought into focus what experts had already recognized as a serious energy problem. That winter underlined for the average American that energy has become as important as the other three basic needs: food, clothing, and shelter.

The era of cheap energy ended forever with the crisis. The new era would be known by the necessary conservation of fossil fuels, particularly oil and natural gas. Fossil fuels are not like the wind, or water, or the sun. Each of these energy sources can be used over and over again. We will most likely have to turn to these forms of energy eventually, but right now the methods for collecting the sunlight or using moving wind and water are not going to last. It is towards adjusting our habits of consumption that this lesson is aimed.

Time Allotment	One class period
Teaching Strategies	A lollipop may be used to introduce the lesson on conservation. Hold up a lollipop and ask: What would happen if I took a bite out of this lollipop, then I took another bite and another? *(It would be eaten up -- all gone.)* What if I licked it, and kept licking it for a long time? *(The result, would be the same, but it would take longer.)* Allow plenty of time for the children to grasp this concept...additional questions may be asked: What would happen if I did not bite and eat all of the lollipop? *(You would have some for later.)* Suppose this were not a lollipop, but stood for something else. Something you would not want to eat, but something you use all the time. Suppose a magician changed this lollipop into gas, oil, or a piece of coal. How could I make sure I would have some left for tomorrow? *(Use it more slowly.)* Can anyone think of a big word that means to make something last longer? Introduce the word conserve. Write it on the chalkboard and allow plenty of time for children to look at the word. Ask students to use the word in a sentence. Develop the concept of energy conservation by introducing the conservation picture book. Distribute copies of the pictures to the class. The pictures may be used to lead into a discussion of energy conservation. Allow plenty of time for children to look at each picture. Let them try to guess how energy is being conserved in each one. The key questions might be as follows: What is happening in this picture? How is energy being saved? Why is it a good idea to save energy?
Extended Learning Activities	Assign students the job of investigating and preparing a report on a source of energy in which they are interested. Brief reports may be made on solar energy, geothermal energy, nuclear, wind, etc. After each report, encourage the class to address questions to the reporter. If more information is required, have the reporter investigate further.

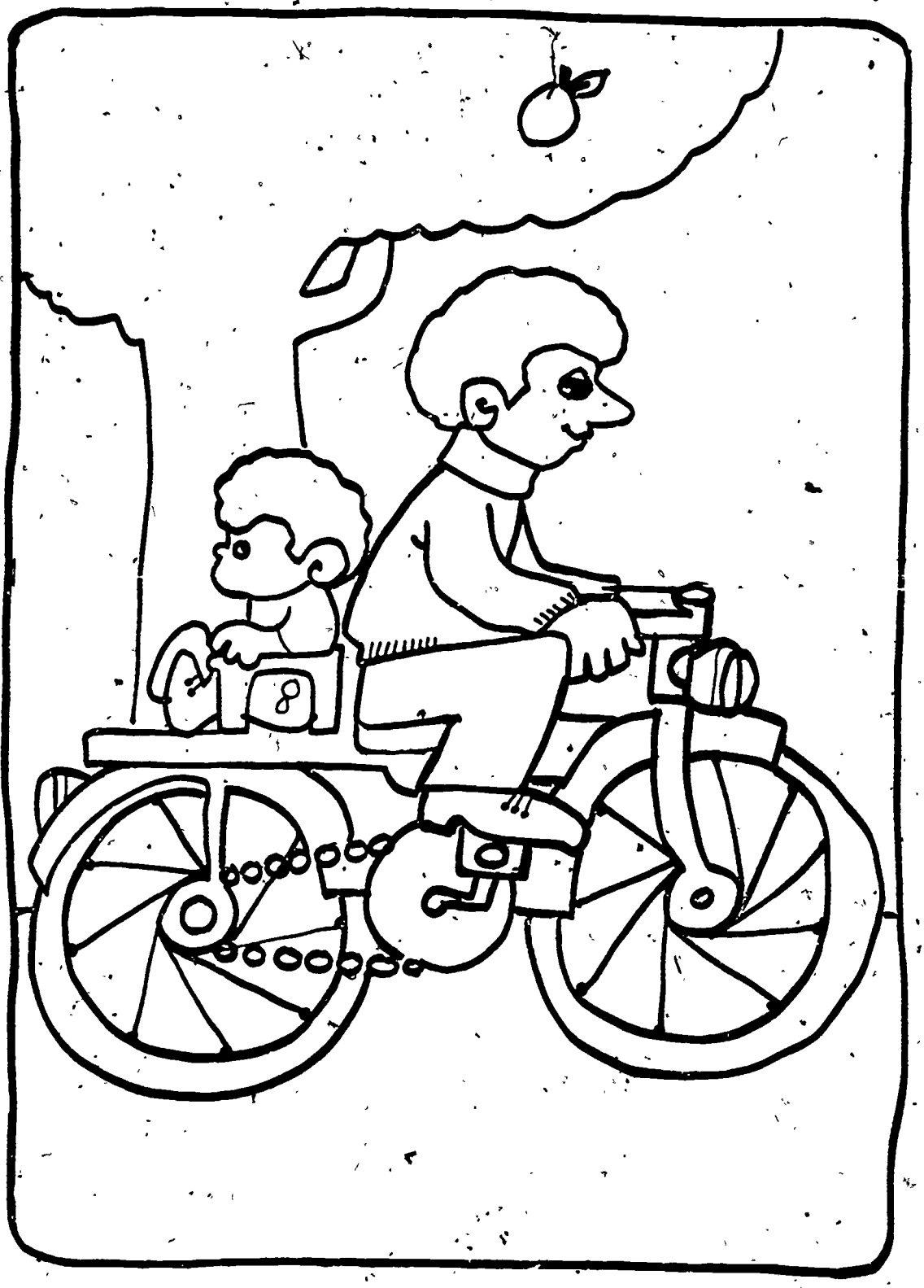
3. Picture Book



ENERGY

can be

CONSERVED

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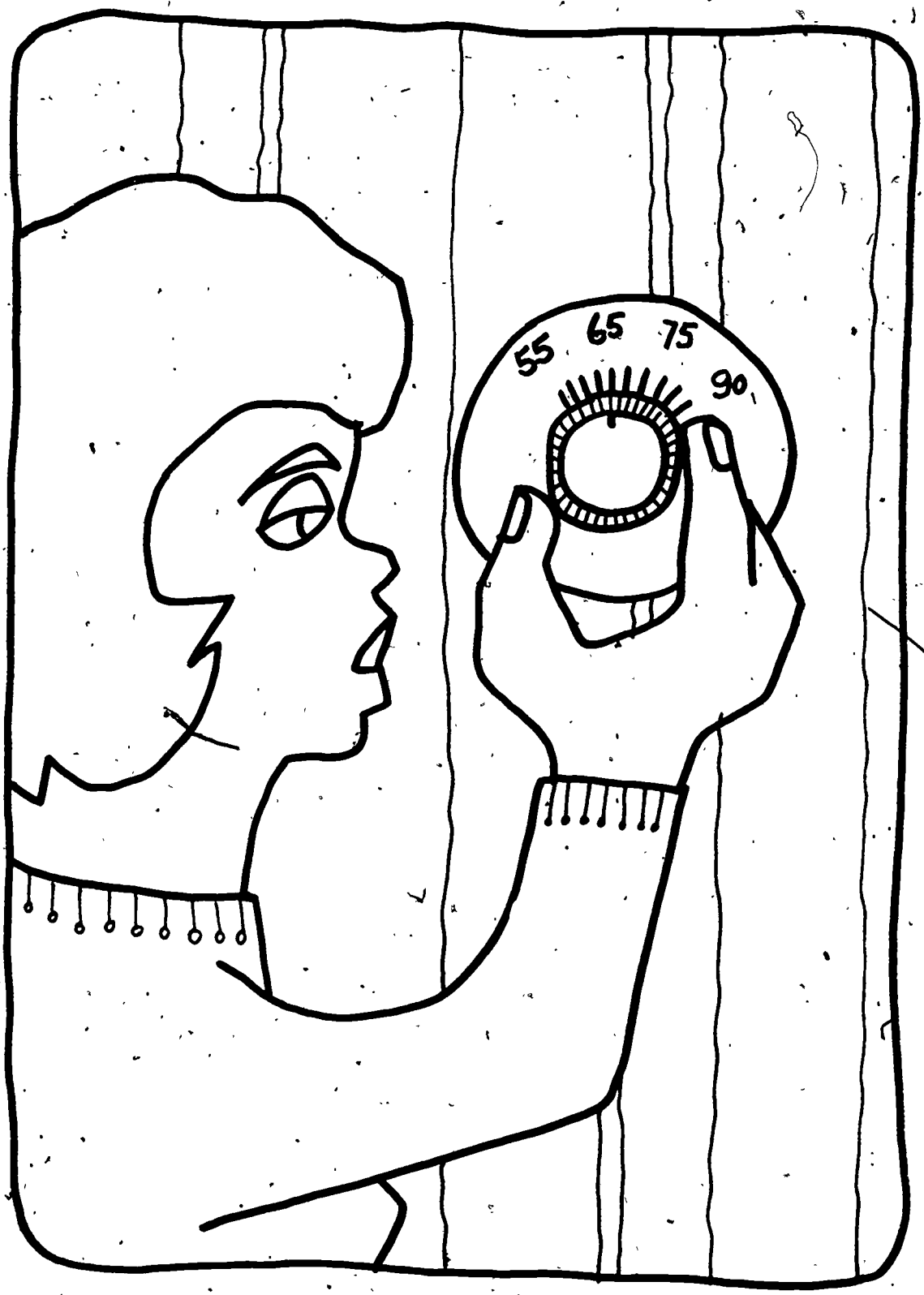
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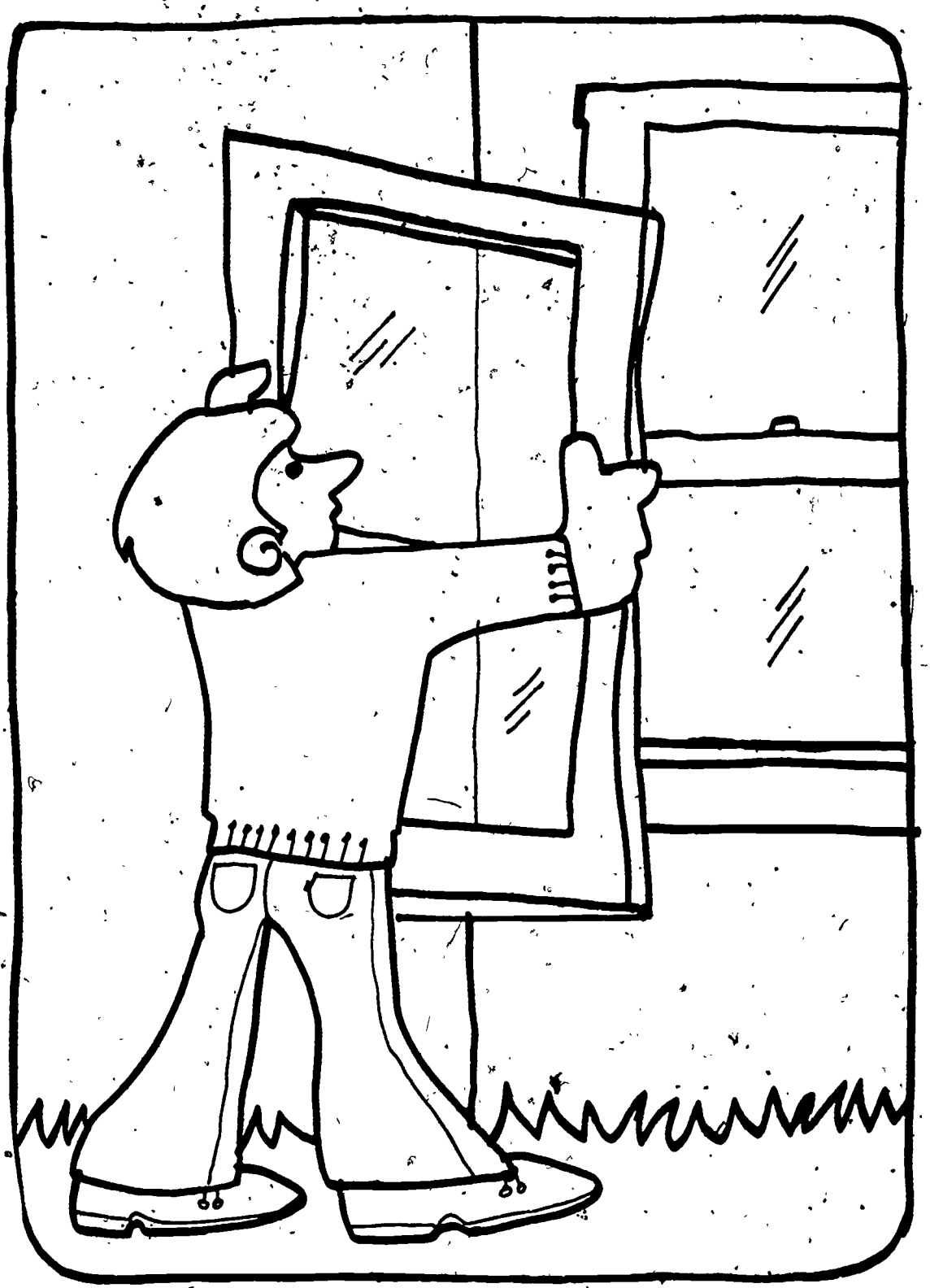

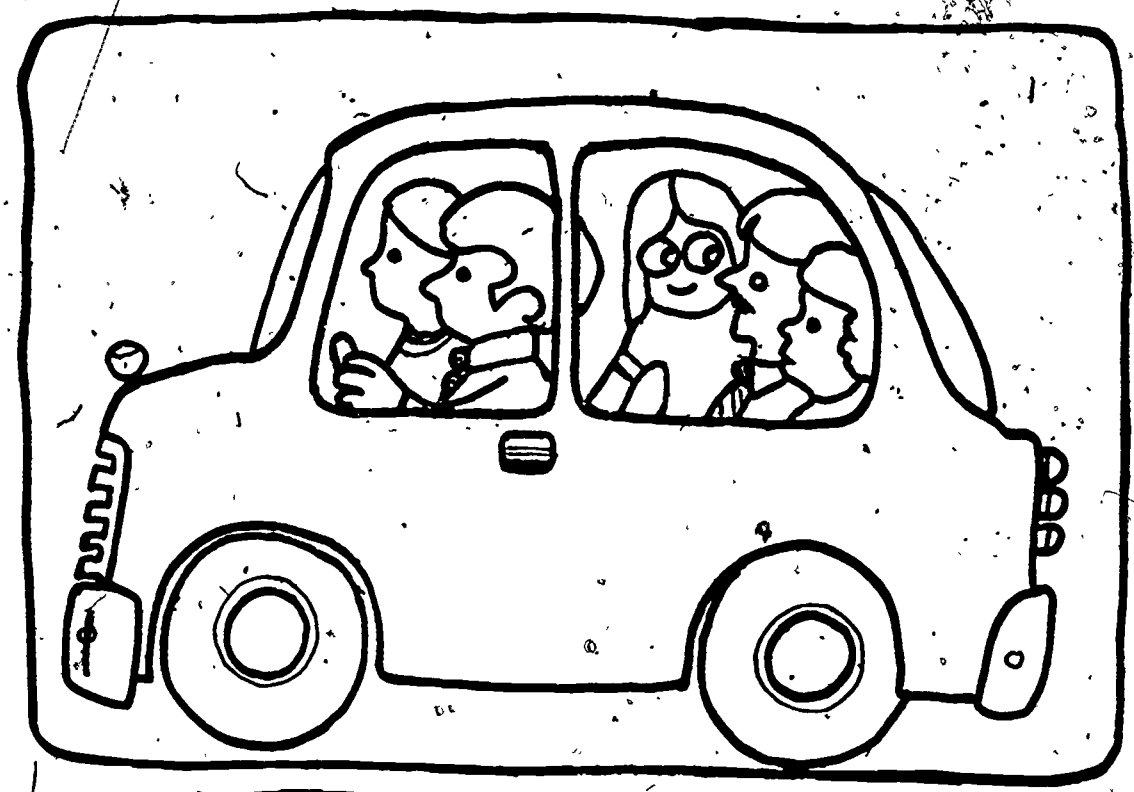

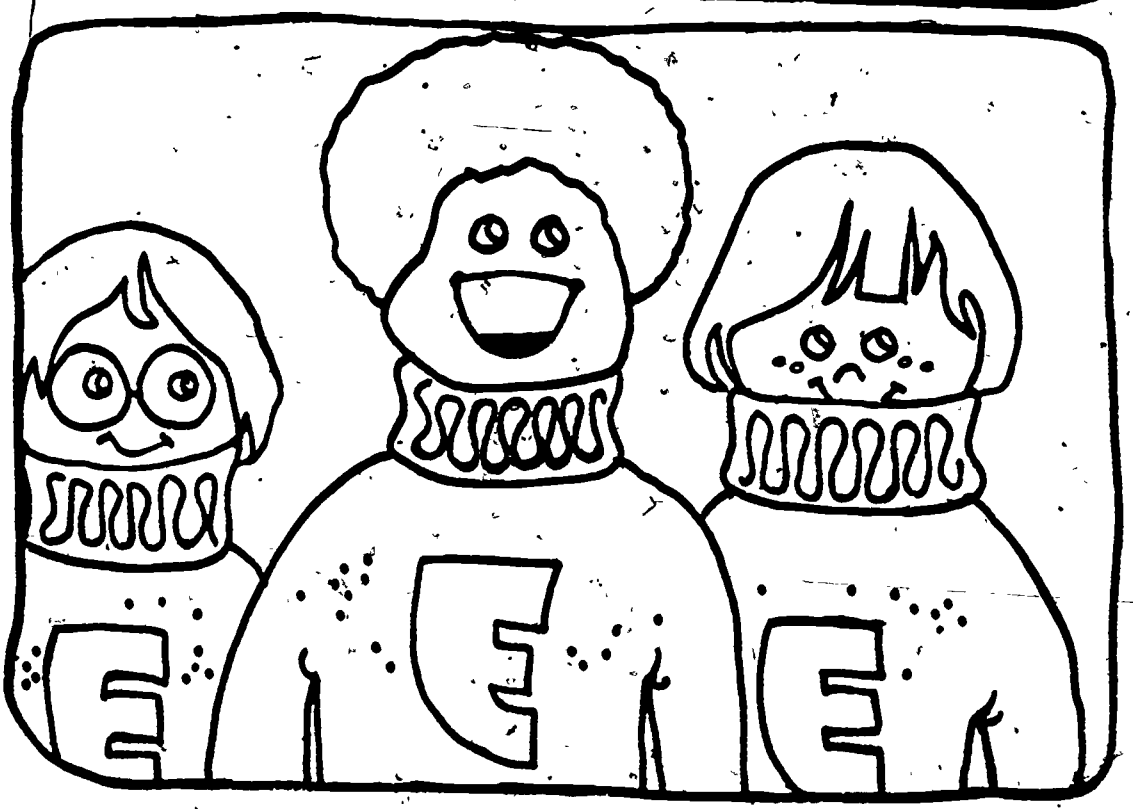

II. Community Workers Who Work Directly With the Sources of Energy

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4. Farmer

Sun's Energy

Overview

This lesson develops the student's awareness of how much the farmer depends on the sun's energy. It provides light for plants to grow, and these plants, in turn, are used to feed the community. Both sun and soil are renewable resources, for they can be used over and over again. The sun's energy is free to the farmer, as is rainwater. Plants can only grow with the sun's energy. Elementary concepts about these resources, and the beautiful balance of nature are introduced in this lesson.

We also want the student to know that the farmer uses much more energy than that of the sun. He needs gasoline for his machinery, and energy is used to make fertilizer, for example.

Objectives

Students should be able to:

1. Identify the sun as a source of energy.
2. Describe heat and light as forms of energy released from the sun.
3. Describe how the farmer depends on the sun's energy and the contribution of his job to the community.

Materials

Seeds for planting: grass, radish, bean, and corn
Milk (or similar) containers
Pencils, paper, crayons
String
1 large box
1 shoe box
Aluminum foil

Background Information (Teacher use only)

The farmer prepares his fields, plants the seeds, cares for the young plants as they come up, and harvests them when they are ripe. Some of the plants are sent to the food processor, some are used to feed the animals on the farm, and some are used for seed. To help him do all this work, the modern farmer has machines costing thousands of dollars.

These machines need energy to do their work. However, these machines would be valueless without the crops. It is the sun's energy that causes the plants to grow.

Green plants, growing in sunlight, use the energy from the sun to make carbohydrates from the water and air, since both of these contain carbon, hydrogen, and oxygen -- all of which are necessary to make carbohydrates. To make protein, green plants add substances from the soil. As the plant grows, it captures and stores energy from the sun in a process called photosynthesis. This lesson calls attention to the sun as the beginning of the food chain.

Time Allotment

One class period for motivation, discussion, and planting the seeds. Ten-fifteen days for observing the germinating and growing processes.

Teaching Strategies

Motivating learning:

Show students a picture of farmers working in fields with the sun shining over them. Ask how these people help our community. Discuss solar energy, rainmaking, weather control, and chemical farming if the questioning period takes this direction.

Encourage students to talk about the sun's energy and the value of green plants. Discuss the importance of the farmer's job. Ask the children to name some food plants.

Part 1: An Experiment Begins

The accumulated information will furnish motivation for a classroom experiment in farming. Invite the children to make a mini-farm.

Put two inches of soil in a large box lined with foil. Mark off four rows with string. Let children plant, say, grass seed in one row, corn, radishes, and beans in the other rows. (Note: any seeds will do as well, except those that need extra large amounts of growing space.)

Cover the seeds with 1/2 inch of soil. Corn can take an inch, however. Seed packets will provide information regarding soil depth and water requirements.

Part 2: Completing the Experiment

Put two inches of soil in a shoe box lined with foil. Let children scatter each kind of seed in it. Cover seeds with 1/2 inch of soil. Ask: How can we find out if plants need sunlight to grow? Encourage children to try putting one mini-farm in a completely dark place and see what happens. Ask children to predict what they think will happen to the seeds put in the dark.

Will the seeds germinate (become plants)? *(Yes.)* Will they grow tall? *(Yes. Trying to reach some kind of light, they will probably grow tall, but will be very spindly. Without light, they will die eventually.)*

A chart can be used to stimulate a discussion about the kinds of knowledge a farmer must have. Use the chart to develop skills in learning to understand the meaning and significance of the title, symbols, labels, and words on the chart. A chart about farming will provide practice in these skills.

Ask: What would a farmer need to know about seeds and plants? Make a chart listing their questions. It might look like the one below.

THINGS A FARMER NEEDS TO KNOW ABOUT PLANTS

Which plant will come up first?
Which plant will grow green and tall?
Which plant will grow thick?
Which plant may not grow?

Add two more columns on the right and have children predict the results of their mini-farm. As the mini-farm develops, make corrections in the Right Answer column.

FACTS WE LEARN FROM OUR EXPERIMENT

	Guess	Right Answer
Which plant will come up first?		
Which plant will grow green and tall?		
Which plant will grow thick?		
Which plant may not grow at all?		

Summary and Evaluation

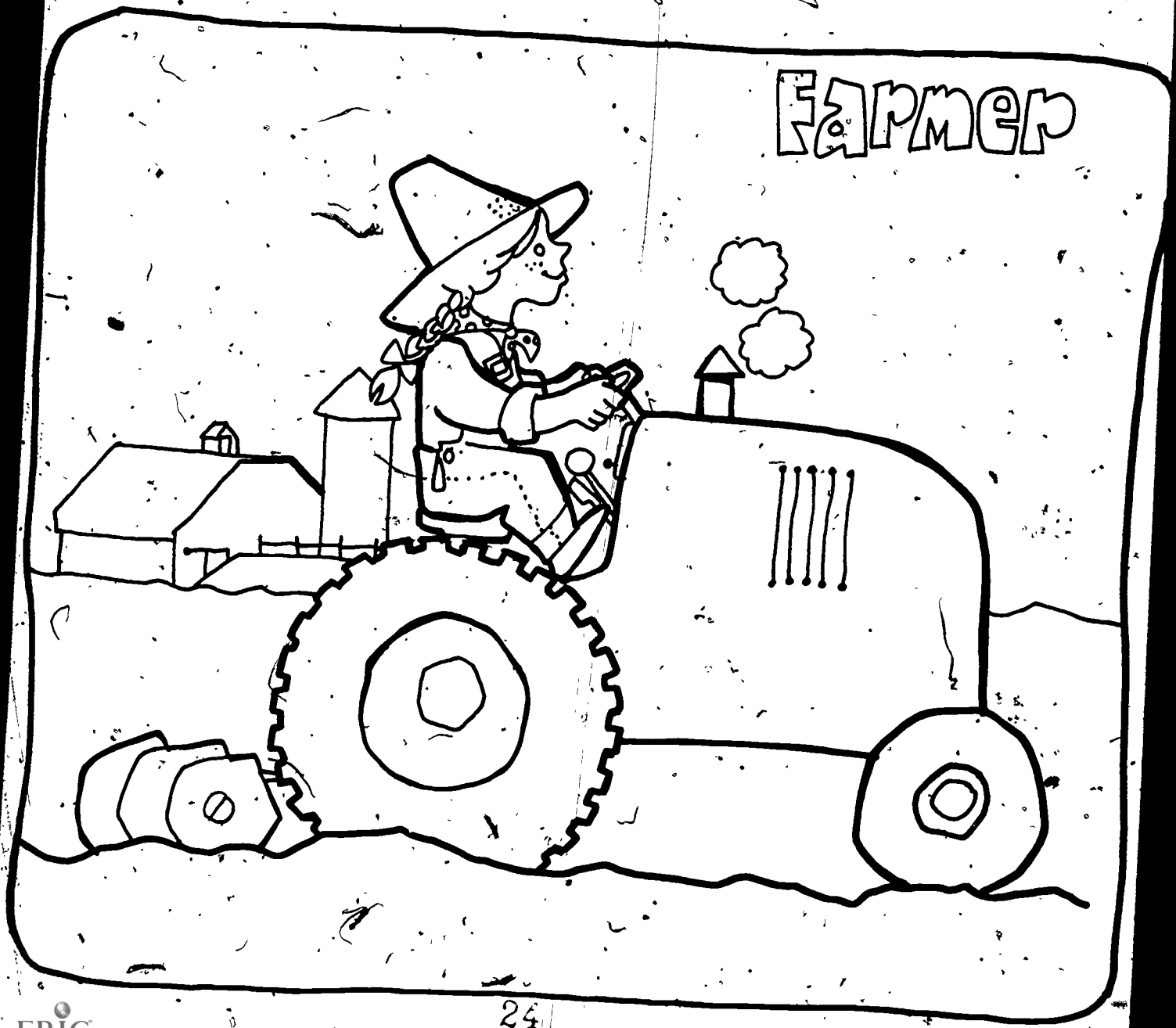
Encourage students to make an Energy Worker Booklet. Cut out magazine pictures, or draw a picture of a farmer. Show the work a farmer does, and write a sentence about the sun.

Extended Learning Activities

Have the class visit a farm, or invite a farmer to speak to the class. In urban areas, contact the local park department to find an experimental farm for the children to visit.

For Accelerated Learners

Think of future jobs using solar energy. Then think up names for the workers who would do these jobs. *(Example: build solar homes and schools.)*


Farmer

5. Grocer

Food Energy

Overview

This lesson develops the children's understanding of the community workers whose jobs depend on food as a source of energy. It deals with the grocer whose job is directly related to our need for energy from food.

Objectives

Students should be able to:

1. Show how the grocer's job is related to the need for energy from food.
2. Identify the different workers in a grocery store by the tasks they perform.
3. Use a scale to determine weight.
4. Compare the monetary value of different coins.
5. Use money to develop one and two place addition skills.

Materials

Grocer's worksheet
Paper, pencils, crayons
Empty food containers
Toy cash register
Spring scale with basket (optional)
Play money (coins and $1 bills)
About 10 apples or other seasonal fruits available

Background Information (Teacher use only)

The characteristics of rural, urban, and suburban communities should be considered in this lesson, since the concept of <u>size</u> is analyzed and comparisons are made in part to help bring this concept into focus. Ideally you will want to review that the people of the United States live in communities large and small throughout the nation. This organization of Americans in communities can be viewed as a system wherein the community is influenced by the actions of the people who live there. Therefore, you may want to work into part of the lesson the twin concepts of <u>goods</u> and <u>services</u>. <u>Goods</u> are things human beings make. <u>Services</u> are kinds of work others do for us, or that we do for others.

The grocer in this lesson represents the many workers found in a supermarket or grocery store: the meat cutter, produce washer, counter clerk, stock clerk, etc.

Food energy can be explained as the flow of energy through the food chain. Food gives our bodies the energy we use to move and to keep us warm. Food energy is also the reason why we grow.

Teaching Strategies

Using the picture of the grocer, ask questions such as:

1. Where would these people be found? *(Supermarket or grocery store.)*
2. Look at Picture 1 (meat cutter). What is this worker doing? *(Cutting meat.)*
3. What will this worker do after he cuts the meat? *(Inspect, weigh, wrap it, and price it.)*
4. What could we call this worker? *(Meat cutter or butcher.)*
5. Picture 2 (produce). What is this worker doing? *(Weighing vegetables.)*
6. What kinds of foods does this worker handle? *(Fruits and vegetables.)* Say: We call these foods "produce," and this is the produce worker.
7. Picture 3 (stock clerk). What is this person doing? *(Pricing and putting cans on shelves.)* Say: All the products found in the store are called the stock. This worker is the stock clerk.
8. Picture 4 (checkout/cashier). What is this person doing? *(Totaling up the purchase.)*
9. What would we call this worker? *(Cashier or checkout clerk.)*
10. Picture 5 (manager). Why is this worker talking on the telephone? Say: This worker orders all the stock for the store and watches over all the other workers. What do we call this person? *(Manager.)*
11. All these people are working with what source of energy? *(Food.)*
12. Why are these jobs important? *(They supply us with food.)*
13. Why is it important not to waste food? *(Because food is a source of energy.)*

Follow-up

Role play: Grocery Store. Set up a classroom grocery store to include the community workers mentioned in this lesson. Have children act out the various community workers' roles. Stock clerks

should price items less than a dollar to make computations easier. Produce workers should use a spring balance to weigh some real items such as apples. Have some children take the role of a customer, each selecting two items from the store and taking them to the checkout area. The cashier should call out the price of each item to the remaining children seated at their desks, who will add up the prices and find the total of the two items. The customer then gives the cashier enough money to cover the sale. The cashier tells the class how much money she or he was given. The children figure the amount of change the customer should receive. The cashier then gives the customer the correct amount of change from the play cash register.

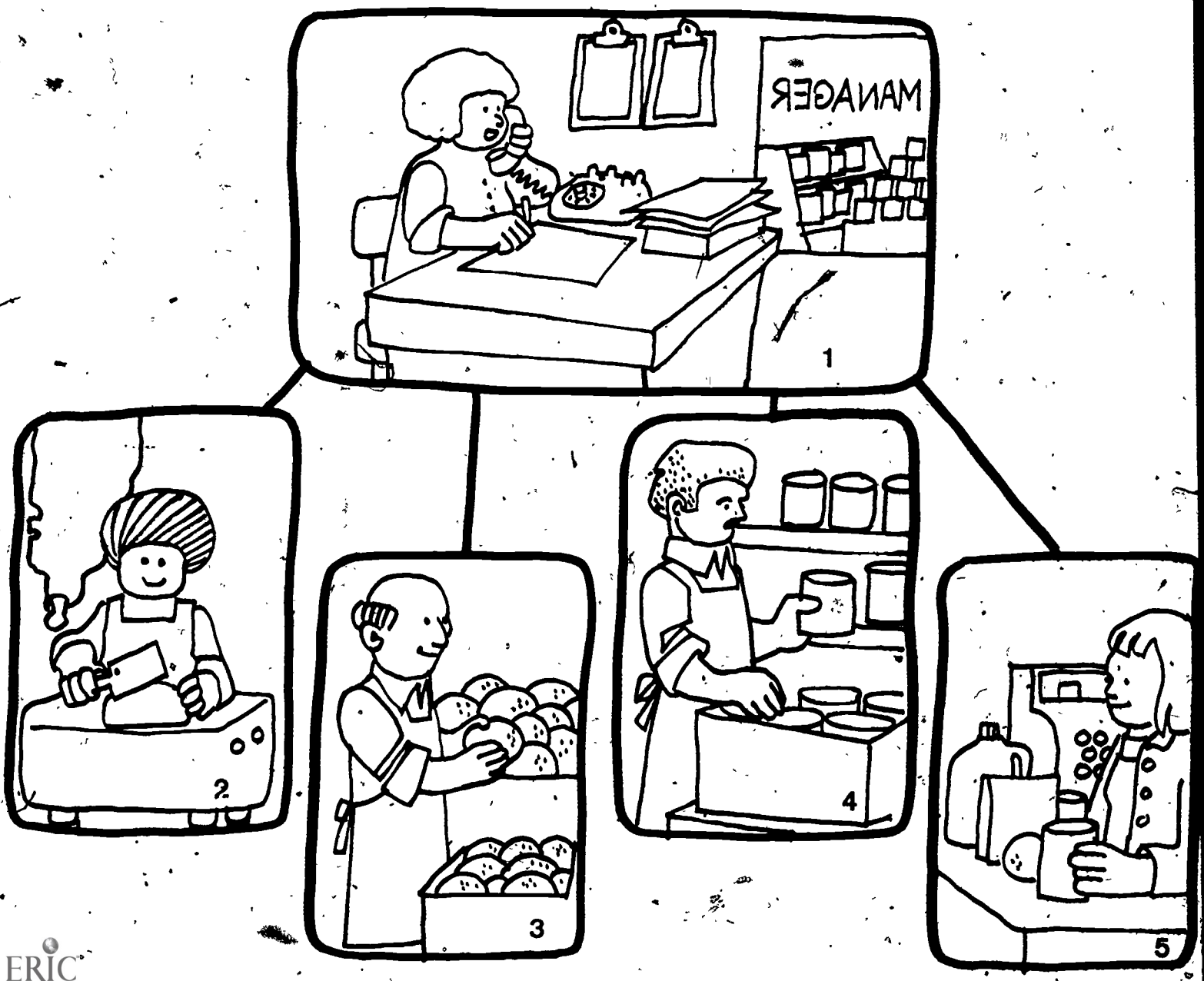
Summary and Evaluation

Children should make or add to their energy worker booklets by writing stories and drawing pictures to show how grocery store workers help other people that live in the community.

Extended Learning Activities

Field trips: Visit a grocery store. Have the children identify as many food energy community workers as they can.

Resource persons: Invite grocery store workers to visit with the class and be interviewed about their specific duties. The workers can tell students of the years of training required and the necessity for learning certain skills during the school years.


MANAGER
1
2
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COMMUNITY FOOD WORKERS

1. Why is this worker using the telephone? *(Ordering stock, cashing checks, etc.)*

   What do we call this worker? *(Manager, Manager-Owner.)*

   Why is this worker in the top picture? *(The job, in part, requires supervising the other workers.)*

2. What is this person doing? *(cutting meat)*

   What will this worker do to the meat after cutting it up? *(Inspect, weigh, and give it a price.)*

   What could we call this worker? *(Meatcutter.)*

3. What is this worker doing? *(Cleaning, weighing vegetables.)*

   What kinds of foods does this worker handle? *(Fruits, vegetables.)*

   What can we call these foods? *(Produce.)*

   What can we call this worker? *(Produce worker.)*

4. What is this worker doing? *(Pricing and putting cans on shelves.)*

   What is a common name for all the products in the store? *(Stock.)*

   What can we call this worker? *(Stock clerk.)*

5. What task is this worker doing? *(Totaling the purchases.)*

   What can we call this worker? *(Cashier, checker.)*

   How can you make sure that you get the right change? *(Count it; from the total cost, subtract your change.)*

Additional Questions

1. What energy sources are all these people working with? *(Food energy.)*
2. Why are all these jobs important? *(They supply us with food.)*
3. What is being wasted when you throw food away or leave it on your plate? *(Energy. People everywhere need food and the energy it gives.)*

6. Food Processor: Baker

Food Energy

Overview

This lesson describes the work of the food processors. Emphasis is placed on the special treatment and preparation foods undergo before they reach the table. The point may be made here that food processing is another kind of system. At this time students can begin to see how the coming together of many parts make a whole: from the step-by-step process of bread making to the systematized dairy and canning industries, toward a greater understanding of the community as a kind of system.

Objectives

Students should be able to:

1. Identify the baker as a food processor.
2. Describe the duties of the baker and tell how this job is related to our need for energy from food.
3. Follow directions in a recipe.
4. Use pictures to explain a food chain.

Materials

Baker community worker picture
Loaf of bread or picture of bread
Pencils, paper, crayons
Scissors
Paste
2 pans (approximately 6" by 9")
Measuring cup
Tablespoon
Knife
Recipe copied on large chart
Oleo (to grease pans)
Energy food chain work sheet

Background Information (Teacher use only)

Millers are workers who grind wheat, rye, and other grains into flour and cereals. In turn, the flour goes to another food processor -- the baker.

Bakeries are food processing places that employ more workers than any other food industry. The process that the baker uses to make bread begins

with the mixing of flour, water, yeast, vitamins, and minerals with the help of giant machines. Then the dough is left to rise about 15 minutes. Other ingredients are added: sugar, salt, and more water, and the dough is mixed again.

The dough is divided into pieces and rolled into balls. It is formed into loaves, put in pans, and left to rise again. Then the pans of dough are placed in the oven and baked, where heat energy from the oven bakes the bread.

Teaching Strategies

Hold up a loaf of bread or picture of one, and discuss the evolution of a loaf of bread. You may ask for student reactions by asking such questions as:

1. What source of energy is this bread? *(Food energy.)*
2. What is this bread made from? *(Flour.)*
3. Where does the flour come from? *(Wheat or rye.)*
4. Where does wheat grow? *(On a farm.)*
5. The farmers need seeds and tools to help make the wheat grow. He also needs the sun. How does the sun help the wheat to grow? *(Light and warmth.)*
6. What does the farmer do with most of his wheat after it is grown? *(Sells it or sends it to a processing plant, called a mill.)*
7. What happens to the wheat at the mill? *(Ground up into flour.)*
8. Is energy used here? Where does it come from? *(Electricity to run the machines.)*
9. Who buys the flour from the mill? *(People, stores, bakeries.)* The lesson may also be opened with a general discussion of the picture of a baker. Ask: What is this worker called? *(Baker.)* What is the baker doing in each picture? *(Picture #1 - mixing dough, Picture #2 - waiting for the bread to rise, Picture #3 - rolling the dough into loaves, Picture #4 - putting the loaves into the oven, and Picture #5 - wrapping the loaves.)*
10. What kinds of energy does the baker use? *(Electricity or gas for the machines and ovens.)*

This is the process the baker uses to make bread before we buy it in the stores. Now, let's be bakers. If we follow this recipe, we will be processing flour into bread as the baker does.

Read the recipe chart with the class. Then follow the recipe.

Mix in bowl: 3 cups warm water
3 tbsp. yeast
1/3 cup honey or molasses
3 tbsp. oil

Add: 6 1/2 cups whole wheat flour
1 tbsp. salt
1 cup powdered milk

Let rise in warm place covered -- 15 minutes. Knead (punch it around) well for ten minutes. Sprinkle flour on table and hands often. Fill pans (greased) 2/3 full. Let rise 15 minutes in warm place. Bake in 375° oven preheated 20-30 minutes. Makes 2 loaves.*

Let children take turns measuring, kneading, acting as timers, taking bread to cafeteria to be baked, slicing and serving bread, and cleaning up. While bread is baking, have the children complete the energy stamp activity on the food chain. Allow enough time to complete the activity, then discuss and correct the sequence.

Summary and Evaluation

Children should add to their Energy Worker Booklets by writing stories and drawing pictures showing how the baker helps the community.

Extended Learning Activities

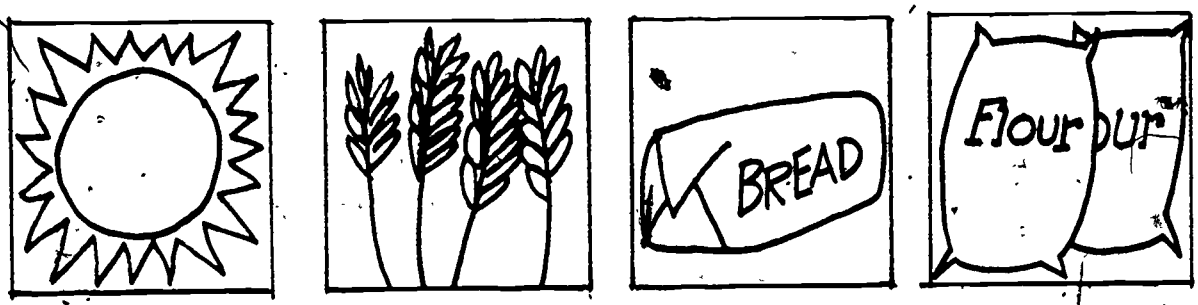
Field trips: Most bakeries permit tours. Take the class at a time when the baker will be there to explain each step in the bread making process. This activity lends itself especially well to a good bulletin board display. All students should be encouraged to contribute drawings about the bakery to the display.

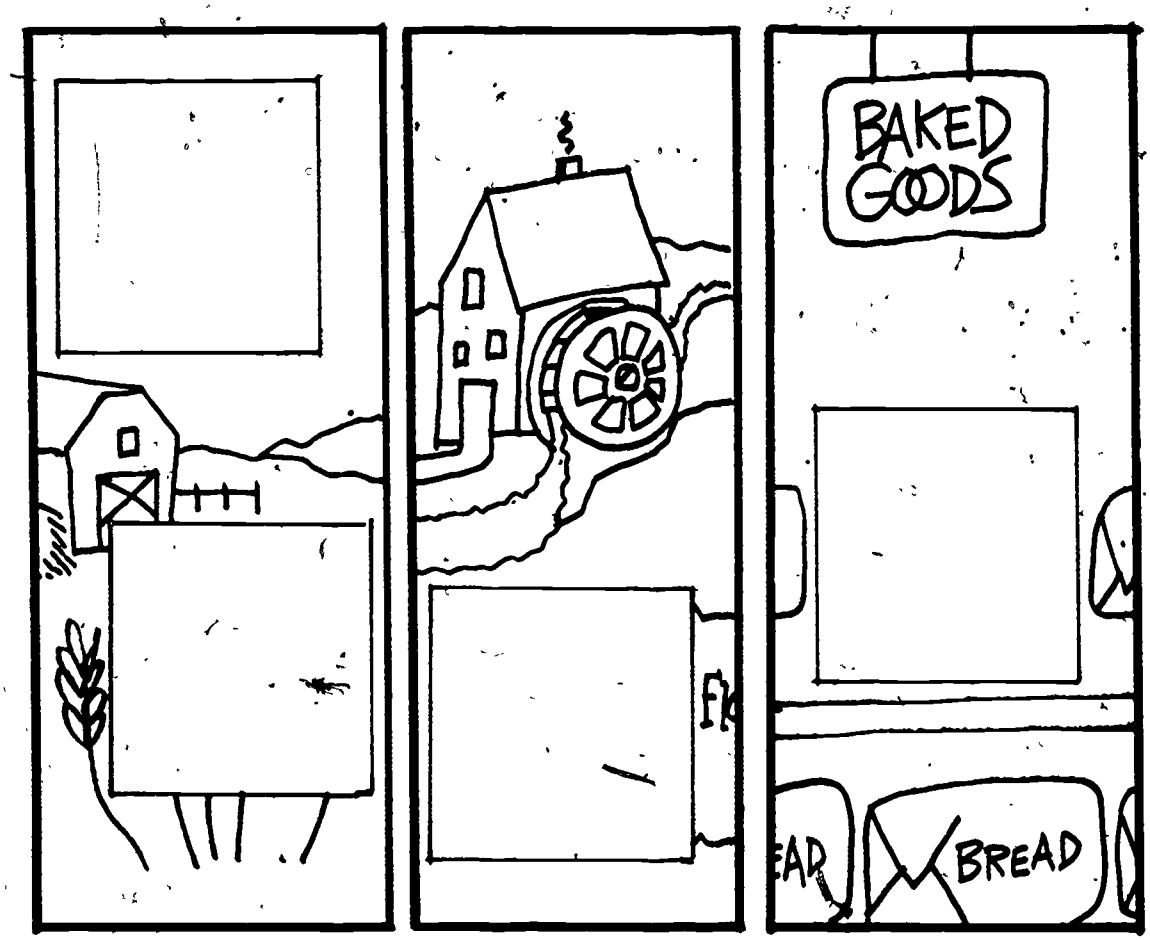
Resource persons: Often there are people in the community (perhaps even someone in the children's families) who know a great deal about a specific subject. Try to persuade a baker to come to the class and speak about the years of training required, and the special skills a baker must acquire.

*Recipe is from Creative Food Experiences for Children by Mary T. Goodwin and Gerry Pollen, Center for Science in The Pubic Interest, Washington, D.C., 1974.


1.
2.
3.
4.
5.
BREAD

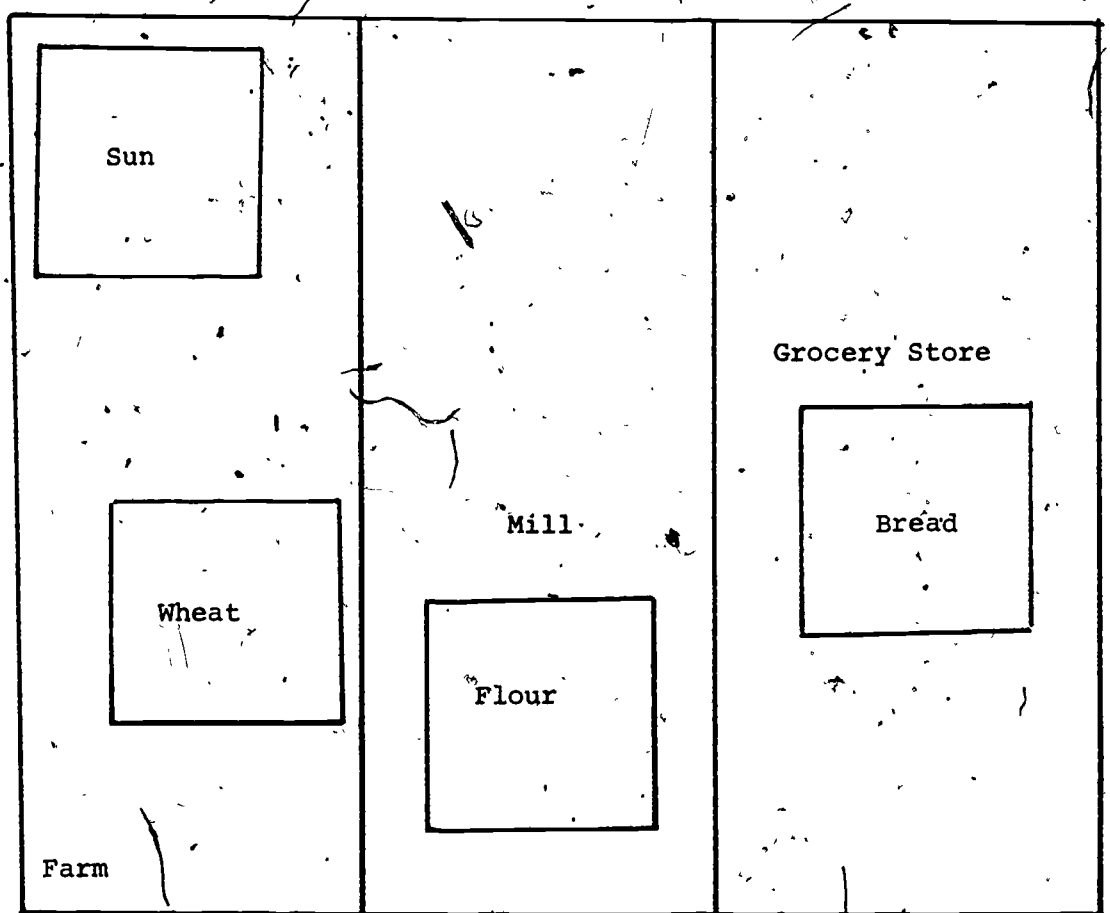
FOOD CHAIN STAMPS





FOOD CHAIN STAMPS
(WORKSHEET)

Sun	Wheat	Loaf of Bread	Bag of Flour



7. Oil Man

Fossil Fuels - Petroleum

Overview

This lesson develops the children's understanding of the community workers whose jobs depend on the delivery of energy. It deals with the gas meter reader, the gasoline station attendant, and the oil man, all of whom have jobs that depend on fossil fuels.

Objectives

Students should be able to:

1. Describe the energy-related work the oil man does for the community.
2. Identify oil as the source of energy that the oil man works with.
3. Trace the sequence of events from the extraction of oil to its delivery in the community.
4. Infer that the oil man's job is closely linked to the conservation of energy.

Materials

Pictures
Pencils, paper

Background Information (Teacher use only)

Oil is a liquid fossil fuel, formed from once-living things and found underground. It is pumped out of the ground through oil wells. When the oil comes out of the ground, it is called crude oil. To make it useful to us, this crude oil is refined. To refine crude oil, it is placed in a furnace and boiled at a temperature range, at atmospheric pressure, from 500-1200°F.

Many by-products are derived from crude oil, such as: lubricating oil, gasoline, kerosene, home heating oil, and natural gases.

Like any fossil fuel, oil must be burned to obtain energy. The heat energy released in the burning of oil can be circulated around the house in two ways: (1) It can be used to heat water to make

steam, and then the steam moves into radiators throughout the house; (2) or it can heat air which circulates through air ducts located throughout the house. Oil is stored in tanks until it is used.

The oil deliveryman delivers heating oil fuel to the community to be used for heating homes and other buildings. When the oil is delivered to the user in drums or pumped into a tank, the oil deliveryman keeps a record of the amount used.

Teaching Strategies

Using the picture series on oil, show the picture of the oil field. Ask: What is this picture of? *(Oil well.)* Where is the oil found? *(Underground.)*

Discuss with the children that this oil is called crude oil. We do not use it the way it comes out of the ground. Certain things have to be done to it first. The place where this happens is called a refinery.

Prepare class ditto sets of the picture of a refinery. Have the children trace with a pencil, the path of crude oil through the refinery, explaining that oil-processing makes it more useful. Ask: How does oil get from a refinery to our community? *(Oil is pumped to distributors' storage tanks, and then trucks take it to the community. Also tanker ships bring oil from other countries, storing it in large tanks.)*

Develop the lesson by showing a picture of the community oil man. Ask questions such as the following to lead the discussion toward the idea that the oil man delivers energy. Energy makes things move.

1. Where is the truck? *(At the school.)*
2. Who is the person? *(Oil deliveryman.)*
3. What is he doing? *(Pumping oil.)*
4. How does oil help us? *(Heats our schools and homes.)*
5. Why is the oil man's job important? *(He keeps bringing us oil so we can stay warm.)*
6. What might happen to our community if there was no more oil? *(Accept all reasonable answers.)* An important concept to bring out is the need for cooperation among people and government. Oil industries also work with these units in meeting many problems.

Summary and Evaluation

Children should add to their Energy Worker Booklets by writing stories and drawing pictures showing how the oil man helps the community.

Energy stamps: Students can show the route oil takes from its start in nature to its point of use in the community. Have the students cut out and paste energy stamps in the proper spaces. Allow enough time to complete the activity, then discuss the correct sequence.

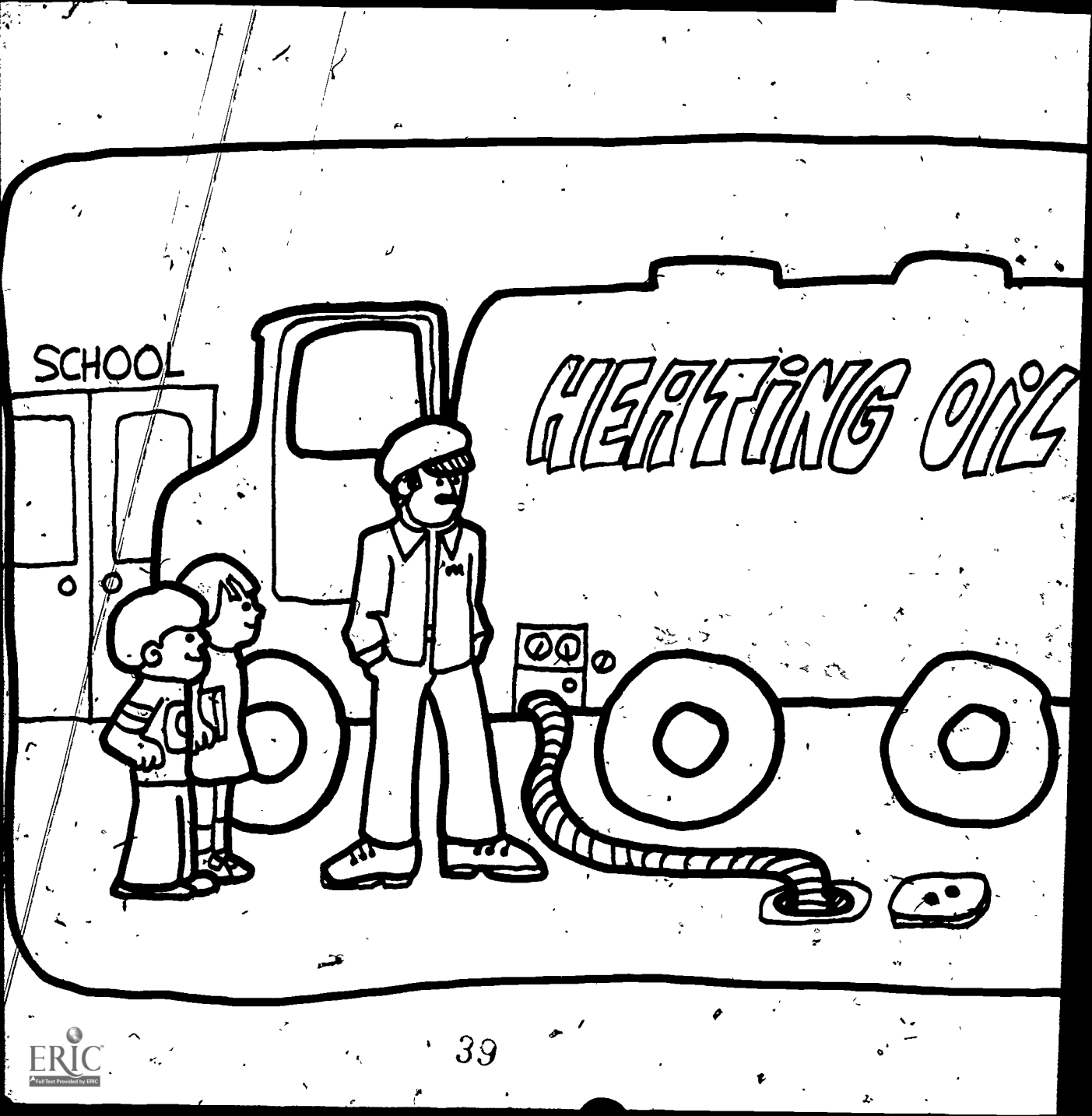
Extended Learning Activities

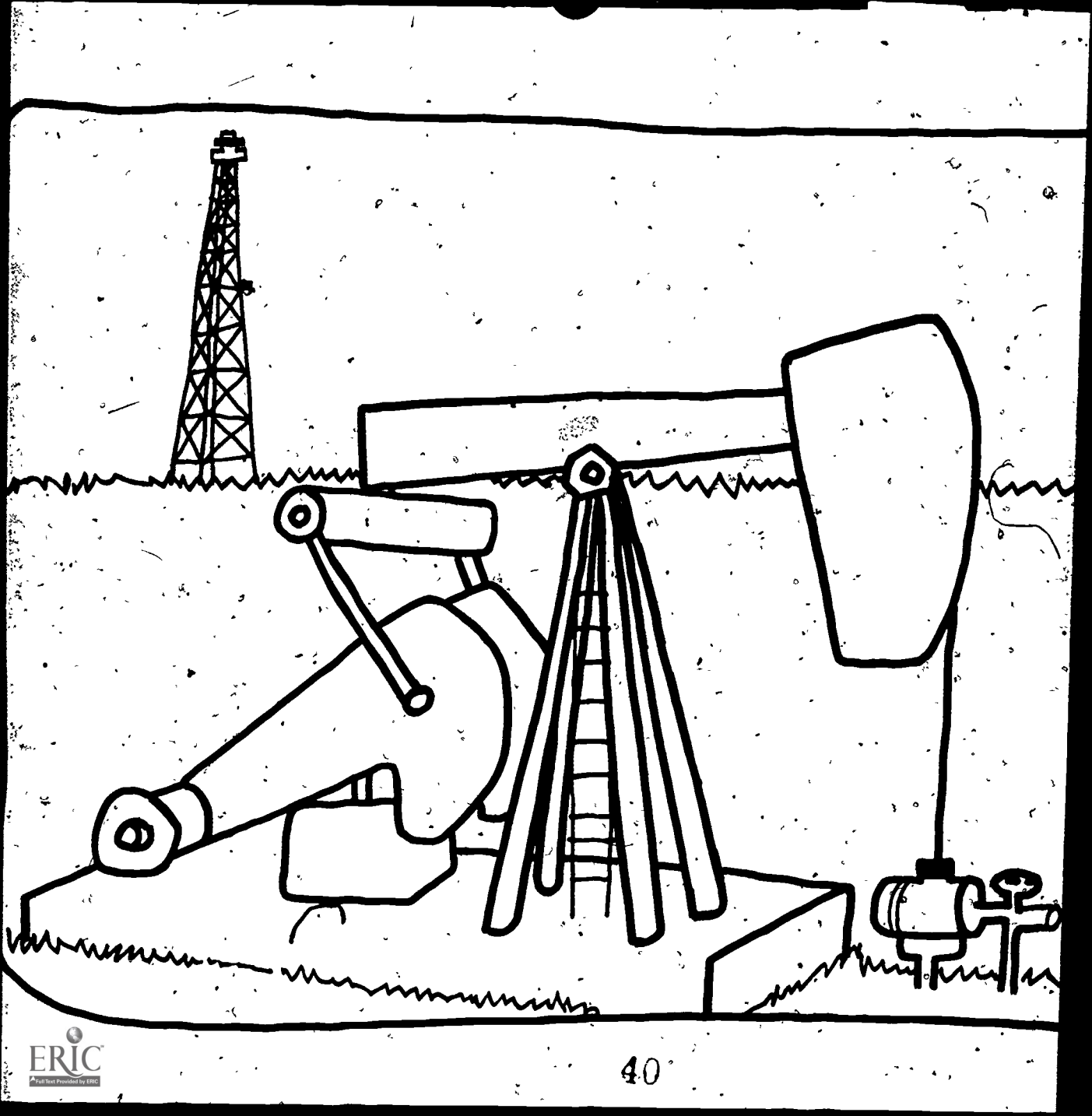
Field trips: Arrange to take the children on a tour of the school boiler room when you develop this lesson. If possible, take the class at a time when an oil delivery is being made. Or arrange for the class to visit a nearby oil company and/or tank farm. Help them make a list of things they want to find out in the way of preparing for the trip.

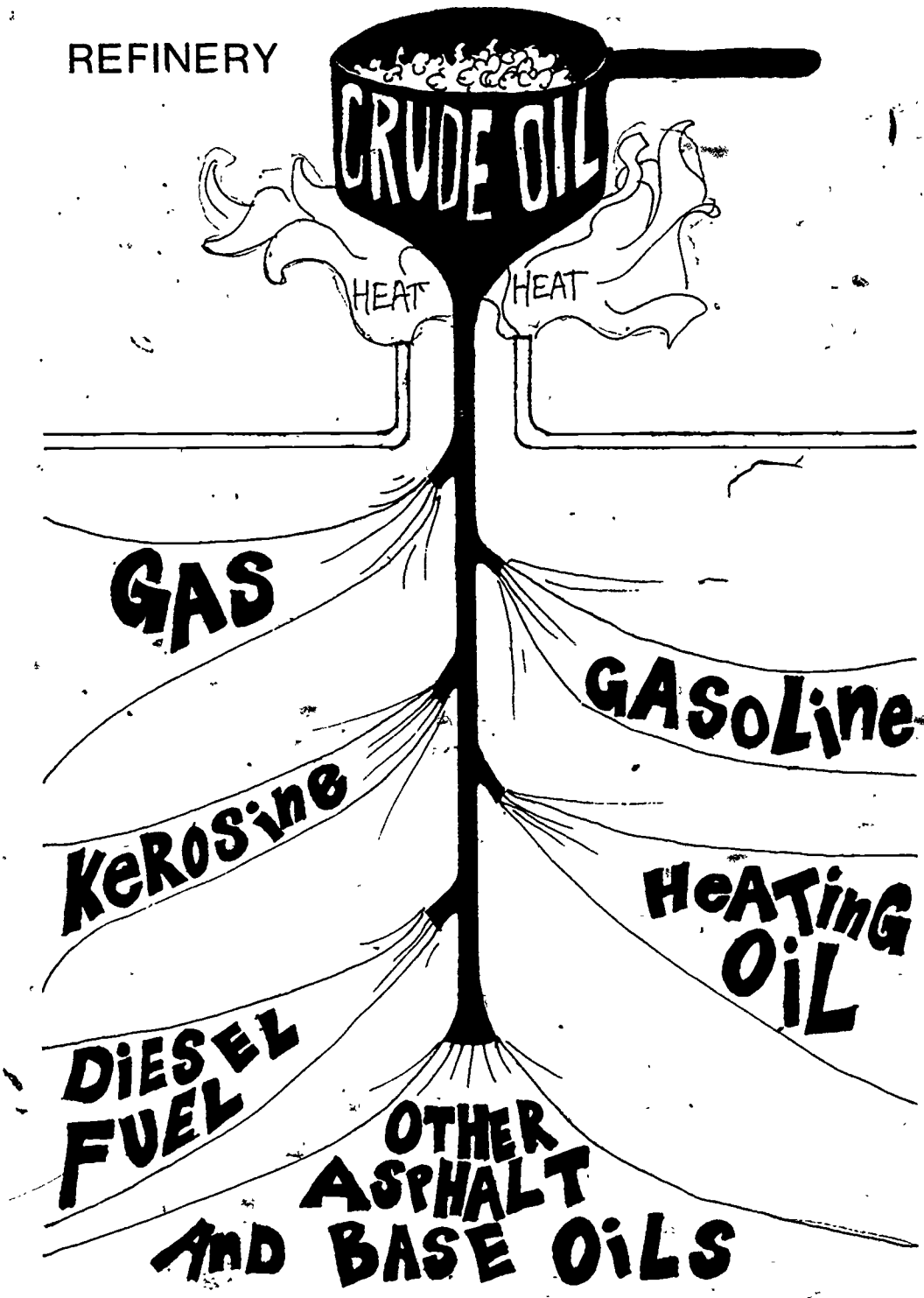
Other energy-related community jobs can, and perhaps should be, included in this unit if they are accessible. In Texas, for example, the class might want to see oil wells. Other regions in the country offer unique places that offer field trip possibilities.

Resource persons: Often there are people in the community (perhaps even someone in the children's families) who can be persuaded to come to the classroom to help the students understand a specific subject. Arrange for an energy delivery person (oil, gas, coal) to come to the class to talk about his energy-related job.

Classroom report: This would be a good time to introduce a student report on producing oil from oil shale.

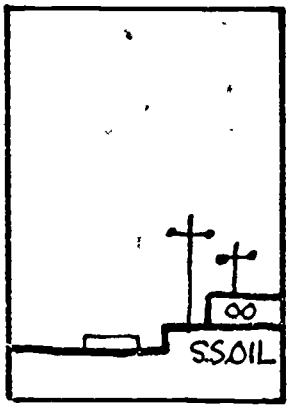

SCHOOL
HEATING OIL




REFINERY
CRUDE OIL
HEAT
HEAT
GAS
GASOLINE
KEROSINE
HEATING OIL
DIESEL FUEL
OTHER
ASPHALT
AND BASE OILS

ENERGY STAMPS
(Worksheet)


7



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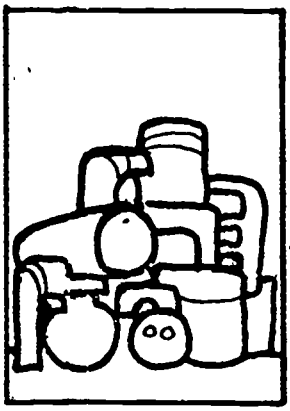
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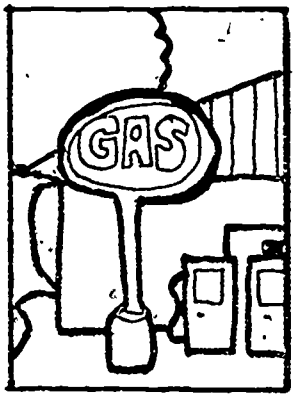

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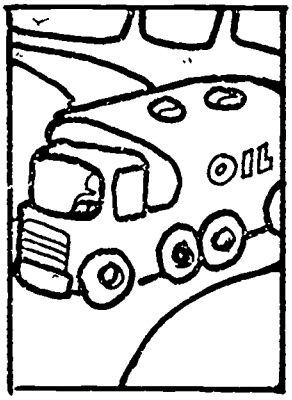

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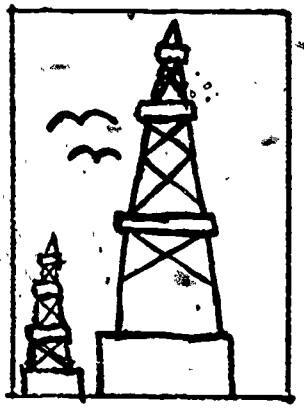
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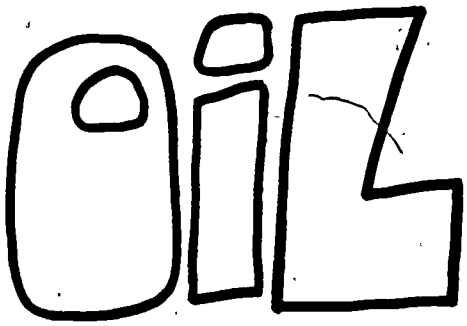
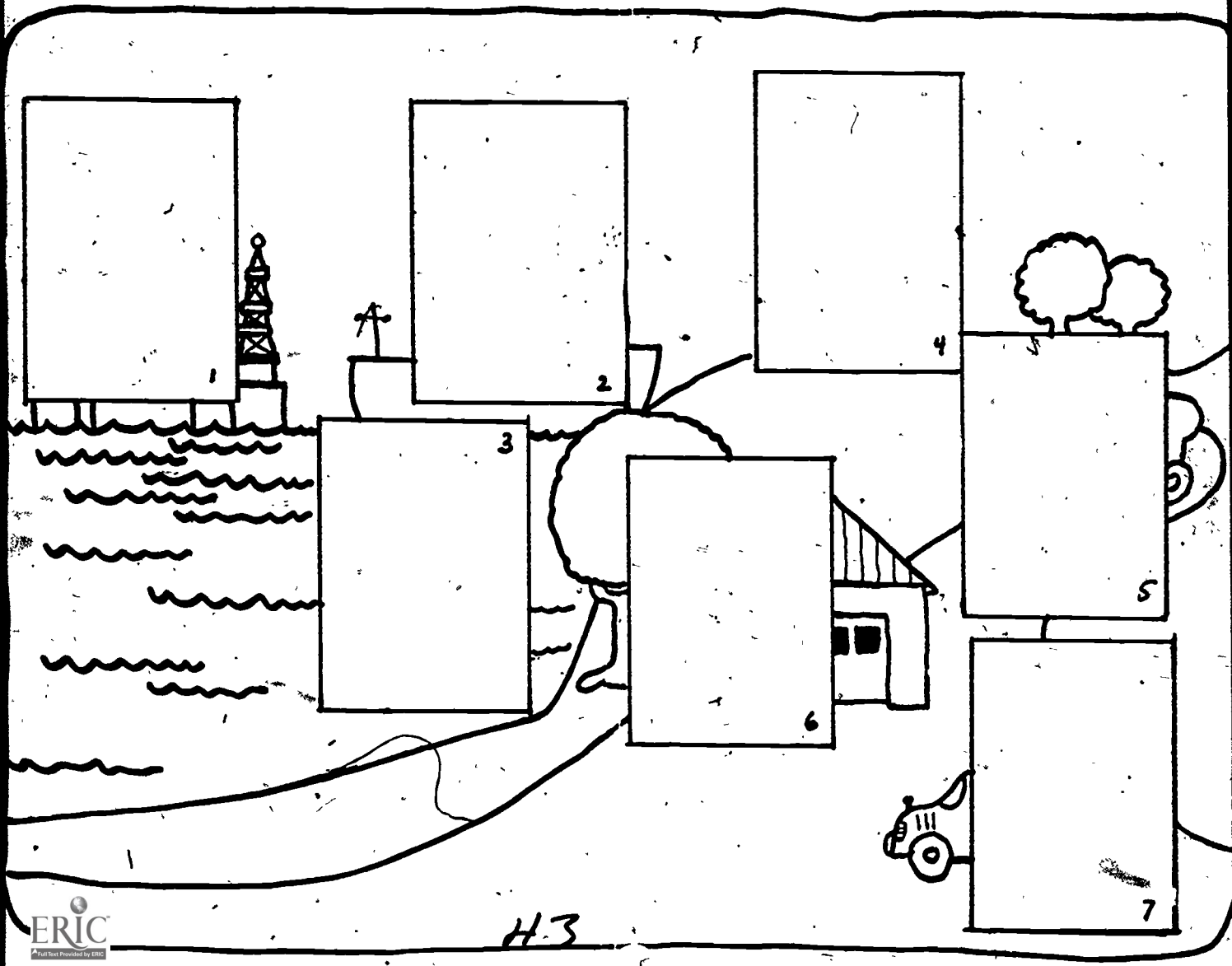


ENERGY STAMPS
(Worksheet)



8. Gasoline Station Attendant

Fossil Fuels - Oil

Overview

This lesson develops the children's understanding of another community worker whose job depends on the delivery of energy. It deals with the gasoline station attendant whose job is close to the students, and one that can help them understand how energy can serve the community.

Objectives

Students should be able to:

1. Identify oil as the source of energy the gasoline attendant works with and describe his duties.
2. List various things that are made from oil.
3. Determine ways in which the gasoline station attendant's job is dependent on oil.
4. Demonstrate the ability to solve story problems through addition of two place numbers.

Materials

Picture of the gas station attendant
Gas Station Helper ditto
Gas Station Game ditto
Piece of foam rubber
Plastic wrap
Empty gasoline can
A record
Pencils, paper, crayons
Dice
Lipstick
Candle

Background Information (Teacher use only)

Gasoline is just one of the many fuels made out of oil. Oil is a fossil fuel that is found underground and under the sea. It is collected by drilling and stored in large tanks until used.

Children might confuse gasoline with natural gas. Gasoline is a liquid, where natural gas is a gas.

It is recommended that you use gasoline throughout this lesson to eliminate some confusion over the terms.

Gasoline station attendants have as their major duty, pumping gasoline, but they must also keep a record of the amount of gasoline stored at the station. Attendants also check oil and water in the cars and provide various personalized services for the customers.

Teaching Strategies

Motivating learning:

One way to begin this lesson is to show the class several items that are made from oil. Items: Styrofoam, piece of plastic, a plastic record, lipstick, candle, Vaseline, lighter fluid, etc. Ask: Can anyone tell me what these things are made from? *(Accept all guesses.)* Ask: They were made from a fossil fuel that is a liquid. Can anybody tell me which one? *(Oil.)* Is gasoline made from oil? *(Yes.)* Where have you seen gasoline used? *(In machines, at gasoline filling stations, etc.)*

Show students the picture of the gasoline station attendant. Ask questions to develop the lesson:

1. Where is the automobile? *(Gasoline station.)*
2. Who is the person standing? *(Gasoline station attendant.)*
3. What is the person doing? *(Pumping gasoline.)*
4. What is the source of the gasoline being pumped? Do you remember what source gasoline comes from? *(Oil.)*
5. What else does the gasoline station attendant do? *(Check oil and water, fill battery, wipe windshields, etc.)*
6. Why is this person's job important to the community? *(People need gasoline for cars, lawn mowers, etc.)*
7. What would happen to this person's job if there was no more gasoline? *(He would lose it. He wouldn't have any money.)*
8. What can people in the community do to save gasoline? *(Car pool, walk, ride bikes, take fewer trips, drive slower, etc.)*

Creating Further Interest

An Automobile Pantomime: Tell children they might like to be parts of a car. They are to come up to the front of the room and make themselves look like a certain part of the car. A child may choose to

become the motor, and other children to be the front end, back end, four wheels, and a driver. Ask: What do we need to make the car go? *(Gasoline.)* Who puts gas in the car? *(Gasoline station attendant.)* Have a child volunteer to put gasoline in the car. Ask: What does the driver have to give the attendant? *(Money to pay for the gasoline.)* What can the car do now that it has gas? *(Move.)* Let all the children who make up the car move forward together. Have several other children come to the front of the room and become parts of a larger car -- a truck perhaps. Follow the same procedures, and ask questions that would elicit the response that a bigger car uses more gasoline than a small one. Perhaps they will infer this idea by the number of children needed to form the larger car. When the children return to their seats, say: Let's make up a story about the gasoline station attendant. What words will we need to know? Write these words on the chalkboard as the children suggest them: station, driver, pump, gasoline, dollars. (You may add other words to this brief list.) Allow plenty of time for the children to look at the words. Have children suggest sentences that would be good to use in a story about the gasoline station attendant. Write their suggestions on the board. Later, erase the specific words, and draw a blank line in the space. For review, have children fill in the blanks from their gasoline station word bank.

Summary and Evaluation

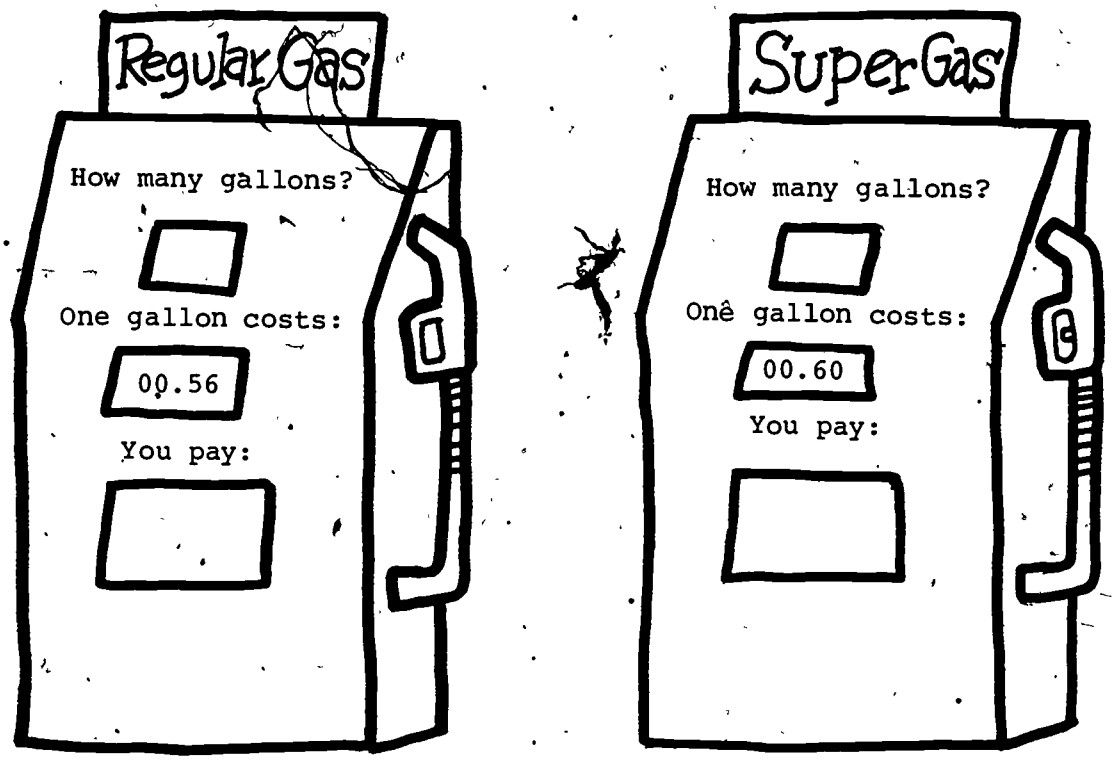
Children could add to their energy worker booklets by writing stories and drawing pictures showing how the gasoline station attendant helps the community.

Extended Learning Activities

Field trips: Arrange for the class to visit a nearby gas station and/or a tank farm. Help them make a list of things they want to find out in preparing for the trip.

Resource persons: Any of the following persons might be invited to talk to the class: station owner, attendant, repairman, mechanic, an oil company executive.

Gasoline Station Helper



Purposes

To review addition skills.
To learn what a gas station helper does.

Today, you are a gas station helper. A car drives up. The driver says, "How much is your super gas?" You say, "Super gas is_____cents a gallon."

The driver says, "I want 5 gallons." You take off the cap of his gas tank. You put in the gas pump. The dials turn. Now 5 gallons have gone into his tank. You take out the pump and put the cap back on his gas tank. You say, "That will be_____dollars, please."

How do you get the answer?

$$\begin{array}{r} .60 \\ .60 \\ .60 \\ .60 \\ +\ .60 \\ \hline \end{array}$$

Now ask your teacher for the Gas Pump Game.

GAS PUMP GAME

Materials Gas game board
Dice
Scorecards
Chart for students needing math help

Players 2-6. Each team has a game board. Each player has a scorecard.

Directions Each player rolls a pair of dice. The one with the highest number goes first. First player rolls dice and writes number of the dice shown on his scorecard under "How many gallons?" He then computes the cost of the gas and writes it on his scorecard under "cost." Next player does the same. Each player gets 10 turns. Each player finds the total cost. If having a "winner" seems necessary, you might have the one with the lowest number declared the winner. There is no real point to be made of winners and losers.

Note: Students who need help with addition may use the chart with costs written on it.

Scorecard

Name_____

How many gallons?	Cost: 60¢ per gallon
1._____	_____
2._____	_____
3._____	_____
4._____	_____
5._____	_____
6._____	_____
7._____	_____
8._____	_____
9._____	_____
10._____	_____

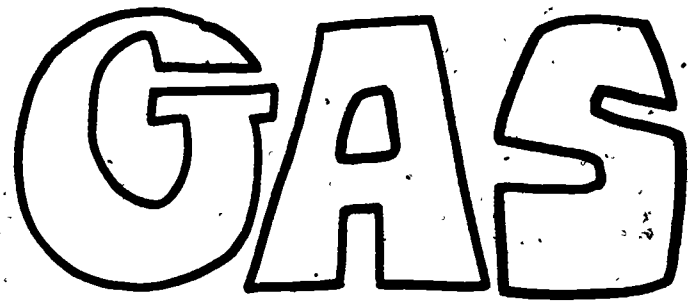
To vary, change the cost of the gas.

Chart

How many gallons?	Cost
1	.60
2	1.20
3	1.80
4	2.40
5	3.00
6	3.60
7	4.20
8	4.80
9	5.40
10	6.00
11	6.60
12	7.20

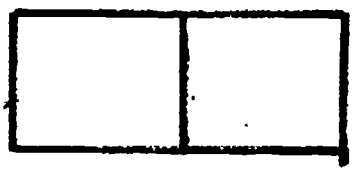
47

GAS GAME BOARD

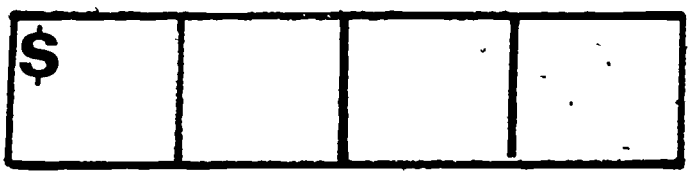


HOW MANY GALLONS?

ONE GALLON COSTS



YOU PAY



SCORE CARD

NAME_____

HOW MANY GALLONS?	COST
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

CHART

HOW MANY GALLONS?	COST
1	.60
2	1.20
3	1.80
4	2.40
5	3.00
6	3.60
7	4.20
8	4.80
9	5.40
10	6.00
11	6.60
12	7.20


GAS
OIL
OIL
OIL

9. Meter Reader

Fossil Fuels - Natural Gas

Overview

This lesson develops the children's understanding of the community workers whose jobs depend directly on a source of energy. It deals with the gas meter reader whose job depends on fossil fuels.

Objectives

Students should be able to:

1. Identify natural gas as the source of energy that the meter reader works with and describe his/her duties.
2. Identify the three basic forms of matter: solid, liquid, and gas.
3. Determine ways in which the meter reader's job is dependent on natural gas.
4. Read four place numbers and use correct place value sequence.

Materials

Picture of the meter reader
Drawing paper
Pencils, crayons
Paper fasteners
Scissors
Cardboard

Background Information (Teacher use only)

Fossil fuels are found underground and extracted and burned to release their energy. These fuels are found in the three states of matter. Natural gas is a gas, oil is a liquid, and coal is a solid.

The motion of molecules causes the changes in the states. In a solid, the molecules are held together by strong forces. They vibrate but remain in relatively stable position. This accounts for the fact that a solid substance has a specific size and shape.

In a liquid, the molecules are moving faster than in the solid, but they are still connected to each other with forces. This increase in molecular motion explains why a liquid has no definite shape,

but takes the shape of the container. Since all the molecules are connected together with forces, they still occupy a definite volume.

In a gas, the molecules move freely and very rapidly; they have neither definite volume nor definite shape. Heat can change matter from one form to another.

Natural gas is collected from underground deposits by drilling and is transported by pipelines. It is stored in tanks or underground wells. Natural gas is colorless, tasteless, and odorless. The odor is added by chemicals for safety reasons. The heat it creates when it burns is used to generate electricity, to heat our houses, provide warm water, and cook food. Natural gas is a nonrenewable fossil fuel in very limited supply. Recently, it was found that when garbage is buried in a landfill and undergoes decomposition, a by-product of this decomposition is methane gas, the same gas that is in natural gas. This newly formed methane is suitable for commercial or home use. Scientists are now working on other ways to make methane from garbage. They can also make it from coal. The gas is piped into our homes. Meters are used to measure how much we use. Meter readers go to homes and other buildings and read the numbers on the meter. There are several kinds of meter readers -- gas, electric, and water. Most meters are found in the basements or outside walls of buildings.

The reader tells the gas company what the new reading is. The company computes the amount of gas consumed and bills the customer.

Teaching Strategies

Motivating learning:

Show the children a solid object (rock) and a liquid (water), and use air to explain a gas. Write the words solid, liquid, and gas on the board, and let the children explain in their own words how these forms of matter are different. Increase interest with a demonstration:

Place an ice cube in a glass. Ask children to predict what will happen to the ice cube. Suggested questions to ask:

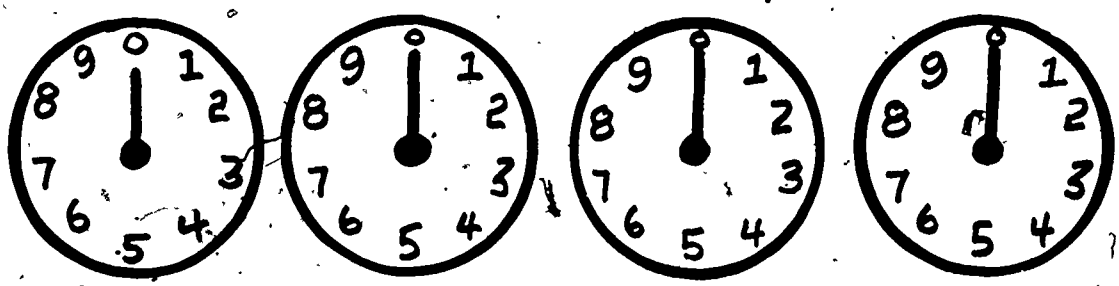
1. Where is the water coming from? *(Ice cubes.)*
2. What will happen to the water if it stands in the glass for a long time? *(Disappear.)*

3. How can we make the ice cube melt faster? *(Heat the glass.)*
4. What will happen if we boil the water? *(Water will become steam and evaporate -- change to a gas.)*

Explain to the children the change from one form to another that happens by adding heat. Develop the lesson further by showing students the picture of the meter reader. Ask questions such as:

1. What object is the person looking at? *(Meter.)*
2. What do you think a meter tells? *(How much gas/oil we use.)*
3. What two kinds of fuels do meters measure? *(Natural gas and oil.)*
4. This meter measures natural gas. How do we use natural gas? *(To heat water and air; to cook food.)*
5. What is the person doing? *(Reading a meter.)*
6. What would you call this person? *(A meter reader.)*
7. What is a meter connected to? *(Pipes for gas or oil to gas producer or company.)*
8. Why is the person reading the meter? *(To report the reading to the gas company so they can determine how much fuel is used and send a bill.)*

Distribute class copies of cardboard circle. Tell children they are going to make a gas meter. Have each child make a dial like the one shown on the picture. Choose four children to stand side by side holding their dials in front of them to form a gas meter.



Have children put all dials at 0. Ask: What would make the dials on your gas meter move? *(Using gas.)* Let child with 1's dial slowly turn the dial. Explain that when the pointer gets past 9, it goes to the next dial, and that every number on

that dial means 10's. Explain that when 99 units of gas are used, it goes to the 100's dial, and when 999 are used, it goes to the 1000's.

Ask which dial would turn fastest. *(1's dial.)* Compare it to the minute hand and the hour hand on a clock.

Applying the Learning

Ask the children to read the meter and to write this number down. This is the beginning reading. Then have them pretend that it's a cold day, and we turn the furnace on and heat water for a bath. What will the dials on the gas meter do? *(Move or go up.)* Ask the children to move the dials. Ask one child to be the meter reader and put the number on the board. This is the ending reading. Then have them subtract the starting reading from the ending reading. This number tells them how much gas was used. We can call it the "gas used" numbers. Let other children be readers until they all get a chance. Have each group subtract the beginning reading from their reading. Put these gas used numbers on the board. Then compare the numbers on the board. Ask: What is the highest gas used number; the lowest gas used number? Ask why it is better to have a lower reading on the gas meter. *(Save money, save energy.)*

Children should make Energy Worker Booklets by writing their own stories and drawing pictures to go with each. Encourage the children to show the duties of the meter reader and to describe their drawings in words.

Extended Learning Activities

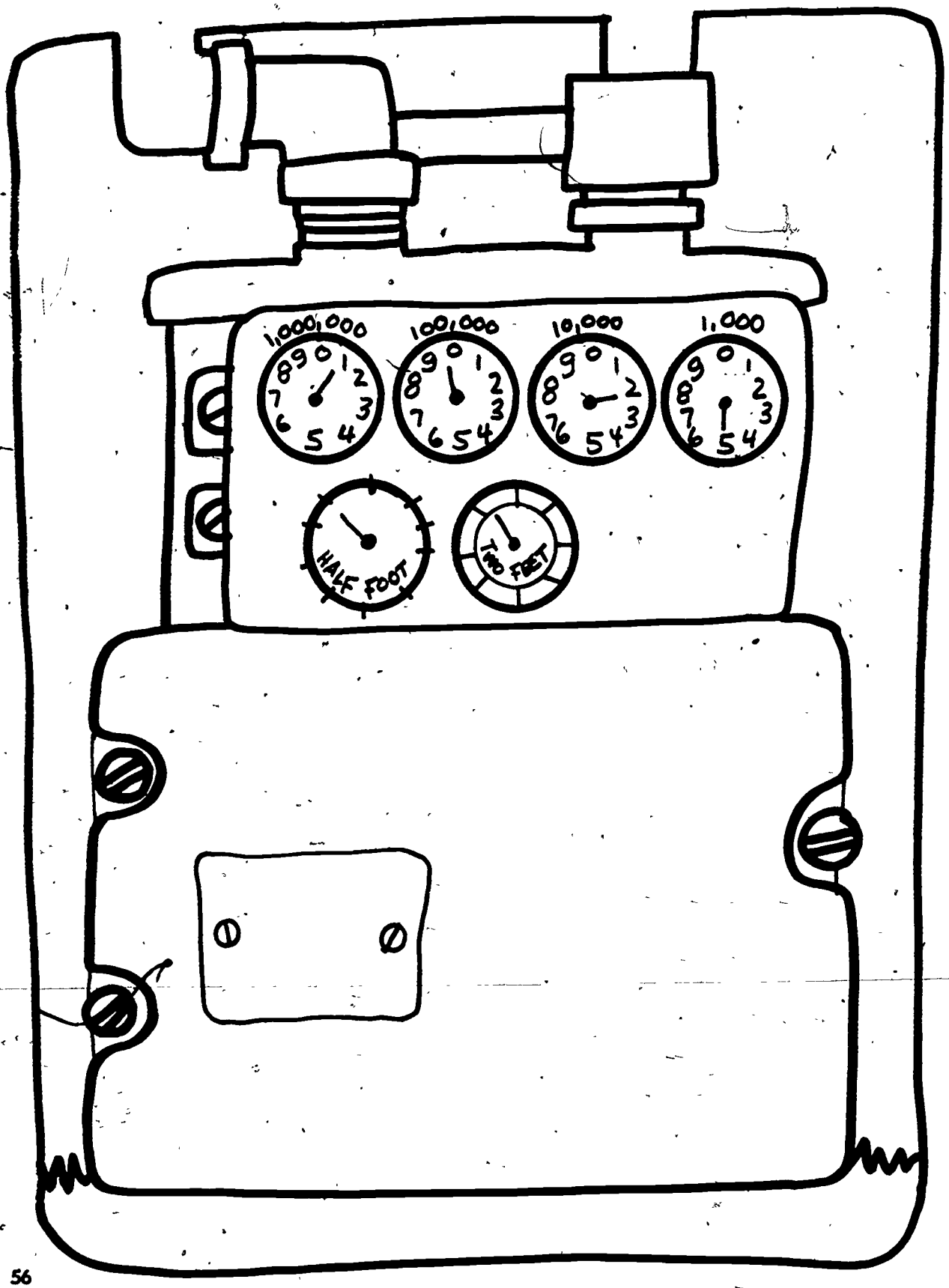
Field trips: Arrange to take the children on a tour of the school boiler room when discussing the meter reader and/or oil man. Take the class at a time when possibly one or both of these workers will be there to explain his/her specific functions and get firsthand experience at seeing the person at work. Have the children write experience stories following the field trips.

Resource Persons: Often there are people in the community (perhaps even someone in the children's families) who know a great deal about a specific subject. Arrange for a telephone person, meter reader, etc., to come to the class and speak about his/her energy-related job.

Arrange for the class to visit a nearby telephone company, power company, and/or gasoline station. Help them make a list of things they want to find out in preparing for the trip.

Other energy-related jobs can be similarly included in this unit if accessible to your locale. Example: In Texas, visit oil wells and discuss the oil-related jobs.

If the children have gas meters at home, ask them to try to read them on two successive days and report their findings to the class.


1,000,000
100,000
10,000
1,000
HALF FOOT
TWO FEET

III. Community Workers Whose Work Depends on a Continual Supply of Energy

10. Transportation Worker: Truck Driver

Fossil Fuels - Petroleum

Overview

This lesson develops the children's understanding of some of the community workers whose jobs depend on the continual supply of the sources of energy. This lesson develops the concept that the needs of people, called goods, must have a means of getting into the community. There are many jobs connected with the transportation of goods. One of these is the truck driver.

Objectives

Students should be able to:

1. Describe the work of the truck driver.
2. Identify oil as the source of energy that transportation workers depend on, since gasoline or diesel fuel are derivatives of oil.
3. List other transportation workers.
4. Use a compass, map symbols, and a key.

Materials

Picture of the truck driver
Map ditto
Pencils, paper, crayons

Background Information (Teacher use only)

Diesel fuel and kerosene are derivatives of oil. This should be discussed so the children will understand that these fuels are made from oil.

There are many kinds of transportation that use diesel fuel. Mainly, large vehicles use this type of fuel, such as trailer trucks, ships, and trains. The airplane uses kerosene, another by-product.

The truck driver brings goods into the community from many different places. The goods that they haul vary greatly. Trucks probably transport more goods than any other transportation mode.

Airplanes transport goods that are needed quickly. There are many pilots who do nothing but pilot goods.

Ship captains are in charge of transporting goods on waterways. The longshoreman or dockworker unloads goods from the ships.

The train engineer helps to transport goods by trains. Trains connect many large cities, and the goods are used by different communities lying within this network of rails.

Teaching Strategies

Using the picture of the transportation worker, ask questions such as:

1. Who is this person? *(Truck driver.)*
2. What source of energy does the truck use? *(Children may incorrectly answer gasoline. At this point you may want to show the picture of a refinery, which can be found in the lesson on the oil man. Point out that diesel fuel is a product of oil refining and that many trucks use this instead of gasoline.)*
3. Why is a truck driver's job important? *(Truck drivers bring us needed goods.)*
4. What kinds of things are hauled? *(All kinds. A lively classroom discussion can develop as children call off one product after another.)*

Develop the lesson further by asking questions such as: What other forms of transportation are used to bring goods into our community? As children name each form, ask them to name the kind of fuel being used and the names of the transportation workers. *(Examples. Ships: diesel fuel -- captain, longshoreman, dockworker; Airplanes: kerosene fuel -- pilot, cargo handler; Trains: diesel fuel -- engineers, freight handler.)*

Extending the Learning

Distribute classroom copies of the map. Allow enough time for the children to get oriented. Go over the key carefully so students understand the symbols. Then ask:

1. What transportation worker delivers goods from the factory to the airport? *(Train engineer.)* The airport is what direction from the factory? *(East.)*
2. What transportation worker delivers goods from the farm to the shopping center? *(Truck driver.)* The shopping center is what direction from the farm? *(Northwest.)*
3. What transportation worker unloads goods from ships at the river? *(Longshoreman/dockworker.)*

4. Who would fly goods to other communities? *(Pilot.)* In what direction is the airplane flying? *(East.)*
5. The river is what direction from the shopping center? *(West.)*

Summary and Evaluation

Children should add to their Energy Worker Booklets by drawing pictures showing the duties of some of the transportation workers and by writing stories describing how they help our community.

Extended Learning Activities

Field trips: Take a tour of an airport, train station, harbor, and/or truck depot during this lesson on transportation workers. Take the class at a time when workers will be there to explain their duties.

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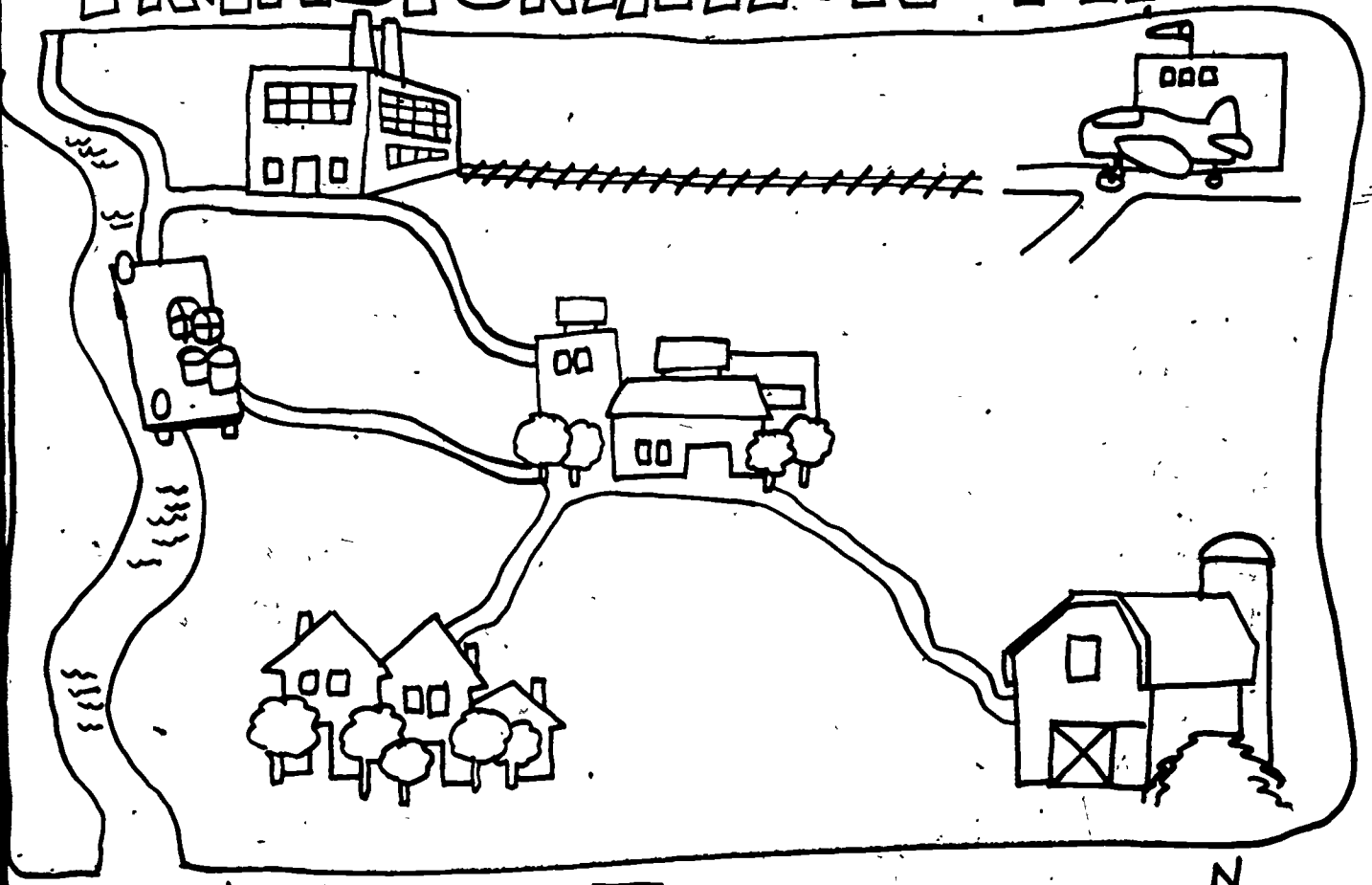
Milk

TRANSPORTATION MAP



Legend:

Houses

Factory

Shopping Center

Farm

Airport

N
NW NE
W E
SW SE
S

11. Electrician

Electrical Energy

Overview

This lesson introduces the children to some community workers whose jobs depend on a continual supply of energy. These workers are the electrician and telephone workers -- lineman, installer, and the repairman.

The lessons focus on the use of electrical energy, which comes to us as light, heat, and sound.

Objectives

Students should be able to:

1. Describe how the work of the electrician is related to the use of energy.
2. Infer from an experiment that electrical energy can be changed into other forms of energy.

Materials

Picture of the electrician
Drawing paper
Pencils, crayons
10-15 batteries
10-15 bulbs
Several pieces of wire

Background Information (Teacher use only)

Electrical energy is an intermediate or temporary form of energy that must be converted to another form to be used. It is generated by using primary sources of energy, especially the burning of fossil fuels, but it can be generated by wind and water. Electrical energy is kinetic energy that is obtained when electric charges are set in motion. It can be transmitted through wires and converted into light; heat, or motion energy.

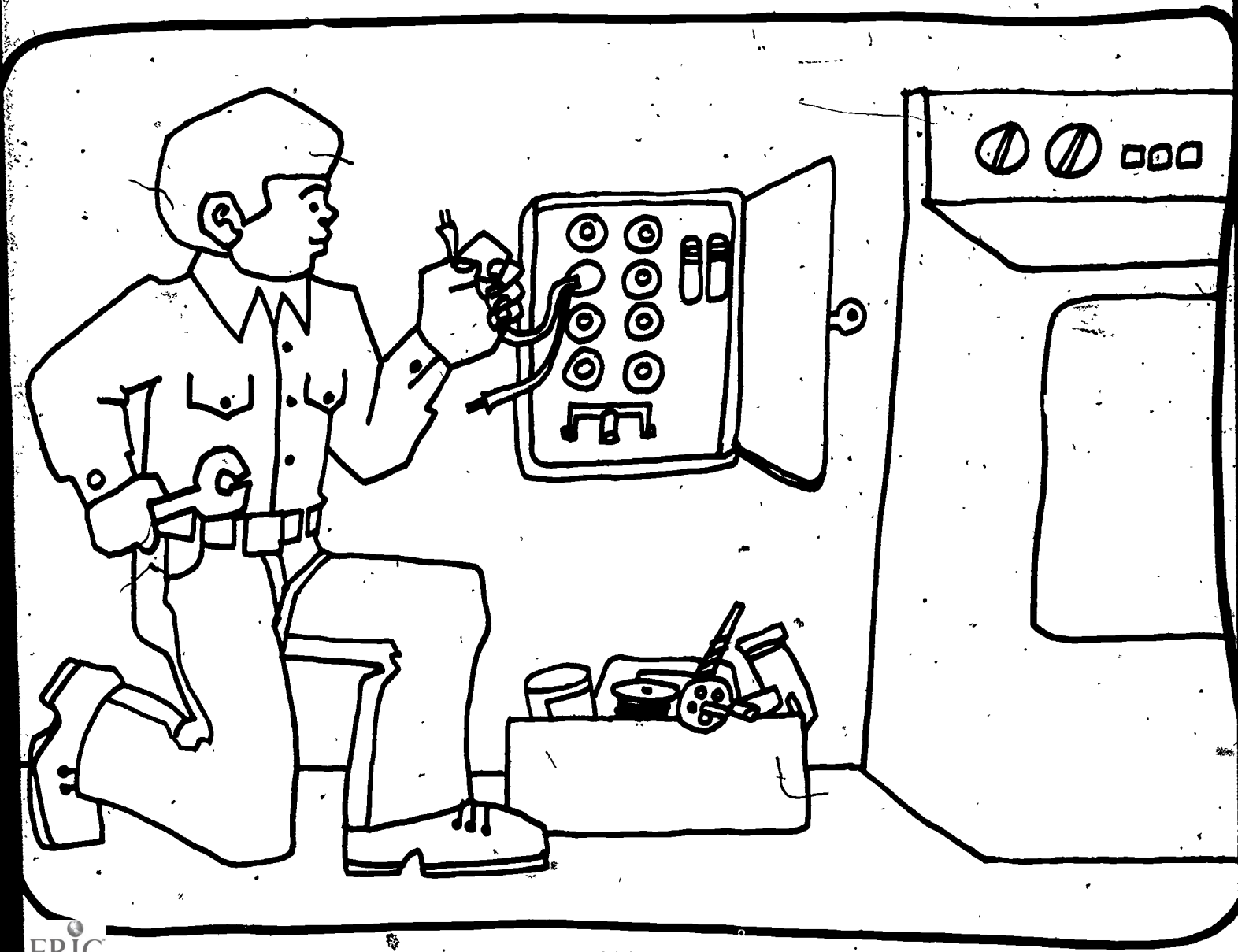
The electrician is a person who knows how to run electrical wires to appropriate places in the house. He knows how to connect wires to the fuse box and to wire fixtures, switches, outlets, and door bells.

Teaching Strategies	Motivating learning: Show students the picture of the electrician. Ask key questions such as: 1. What is this person doing? *(Connecting wires to fuse box; replacing a fuse.)* 2. What should we call him? *(Electrician.)* 3. What energy form does the electrician work with on his job? *(Electricity.)* 4. Where does electricity come from? *(From the power plant.)* 5. Where does the power plant get its energy? *(Fossil fuels, waterpower, nuclear reactors.)* 6. What would happen to the electrician's job if there was no more electricity? *(Allow a brief reaction from the students on this question. Have them name some home uses of electricity. Then come back to the question to bring out our dependence on electricity.)* 7. What can the community do to see that this does not happen? *(Allow adequate time for students to express their ideas.)*
Developing the Lesson	Distribute batteries, bulb, and wire to small groups of 3-4 children. Tell the children to try to light the bulb. While the experiment is going on, you may want to present some basic safety rules about electricity. However, this experiment is safe to do.
Summary and Evaluation	Place the following question on the chalkboard: How does electricity get into the school? Take the children outdoors to observe electric wires. Have students suggest where the wires lead to. Remind the children that the amount of electricity used is recorded on a meter. The children can find the meter in their homes and observe and try to read it. They can observe that the dials move faster when more electricity is being used. (A full explanation on the meter is contained in the lesson on the meter reader in this packet.) Children should add to their Energy Worker Booklets by drawing pictures of the electrician and his work. Encourage the children to show how the electrician helps our community.

Extended Learning Activities

Field trips: Arrange for a class to visit an electrician's shop. Help them make a list of the things they want to find out. Other energy-related jobs can be similarly included in this unit if they are accessible to your region. For example: You may wish to visit a hydroelectric dam or a mining operation.

Resource persons: Parents, other teachers, or someone in the community may be called upon to explain the uses of electricity. Perhaps you can arrange for an electrician, meter reader, etc. to come to the class and talk about the practical tasks of operating electrical equipment.



12. Telephone Workers: Lineman, Installer, and Repairman

Electrical Energy

Overview

This lesson introduces the children to some of the community workers whose jobs depend on a continual supply of energy. These workers are the telephone workers -- linesman, installer, and the telephone repairman.

The lesson focuses on the use of electrical energy, which comes to us as light, heat, and sound.

Objectives

Students should be able to:

1. Describe how the work of the telephone workers -- lineman, installer, and repairman -- is related to the use of electrical energy.
2. Infer from an experiment that electrical energy can be changed into other forms of energy.

Materials

Picture of telephone workers:
lineman, installer, and repairman
Drawing paper
Crayons, pencils
Wire
Batteries
Bells
Juice cans, a nail hole in bottom
6 ft. length pieces of twine

Background Information (Teacher use only)

Sound is caused by vibrations, that is, by the regular motion of molecules. These vibrations travel in waves. Like a light bulb, the telephone operates as a part of an electrical circuit. The energy source is at the telephone company building. The conductor (carrier) is the wire and cable that leads from your telephone to the telephone building. The telephone is the apparatus, and the switch is in the telephone. The electrical energy which travels through the telephone lines carries the information that you put in by talking.

The telephone also has two other important parts. The bell is operated by electric current to call someone to the telephone. The dial, when operated, sends a kind of electrical code to search out and find the other telephone you are dialing. These uses take energy too.

There are many workers needed to keep this system going.

The lineman knows how to connect telephone cable (wires) from the telephone company to the poles outside which bring the sound to and from our homes.

The installer brings the telephone to our homes and connects it to the wire from the outside.

The repairman comes when the telephone needs to be repaired.

Teaching Strategies

Show children the picture of the telephone workers. Allow enough time for the class to look at it carefully. Then ask key questions such as:

1. What is this person doing? *(Connecting telephone cables from a pole to a home.)*
2. What would we call this person? *(Lineman.)*

Questions 1 and 2 should be repeated for the other pictures. Picture number 2 shows the lineman putting in underground cables for the telephone. Many large cities and new suburban communities have regulations that enforce the installation of underground cables rather than overhead lines.

Picture number 3 represents the telephone installer, while number 4 shows a repairperson. The class may have a lively debate over which picture shows the installation of a telephone and which shows the repair of one. Often the installer and the repairperson are one and the same.

3. What energy form do telephone workers have to have in order to do their job? *(Electricity.)*
4. What would happen to the telephone workers' jobs if there were no more electricity? *(Allow time for the children to consider the nature and importance of electricity and the telephone in their daily living.)*
5. What can the community do to see that this does not happen? *(Telephone workers for a day: Help*

students consider these questions by becoming telephone workers for a day. Have them make a tin can telephone.)

Punch holes in bottoms of several juice cans with a nail. Cut off a 2 meter (6 ft.) length of string from a ball of twine. You can use one can for the receiver in the home; the other can represent a telephone receiver in the store, a school, or a student's home. Let several pairs of children take turns speaking softly into one can and listening through the other can. If the string is kept taut, the sound can be transferred pretty well.

When using the tin can telephone, the children should face away from each other and from the class to avoid distraction and to keep from seeing each other, as in an actual phone conversation. It would be ideal if one tin can receiver could be set up in another room or outside in the hall.

You will have to make sure that the students do not think that this sound is being carried by electricity. In the tin can telephone, the bottom of the can vibrates (the students can feel this if they talk loudly and lightly touch the bottom). This vibration causes the string to vibrate in the same way and to recreate the original sound. In the telephone, the vibrations caused by the sound are changed into electrical vibrations which go through the telephone wire and are then changed back into sound vibrations at the receiver.

The children will soon tire of calling each other without having anything specific to say. You will need to suggest some role-playing situations to give them something to talk about:

1. Call a grocery store to find out the price of a can of tuna fish.
2. Call a toy store to see if they have skateboards.
3. Call mother to ask permission to go to a friend's house after school.
4. Pretend to be a telephone operator who has to place a call for a customer who wants to reach the President of the United States.
5. Call the airport to find out if there is a plane leaving for_____, and make a reservation on it.

Using these situations as starters, you can help the children invent many other telephone call situations.

Use this lesson to encourage telephone manners and as an instrument to develop the feelings of poise and self-confidence. The telephone experiment can be used to reinforce language arts skills of speaking clearly, distinctly, and confidently. It can also encourage attentive listening.

Along with this activity, the children can use batteries, wire, and bells. The children can experience changing electrical energy into sound (motion) through simple experiments.*

Summary and Evaluation

Clinch the lesson by asking the key questions:

How and where do the telephone wires get into the school and home? Take the children outdoors to observe telephone cables or the point of entry if they happen to be underground cables.

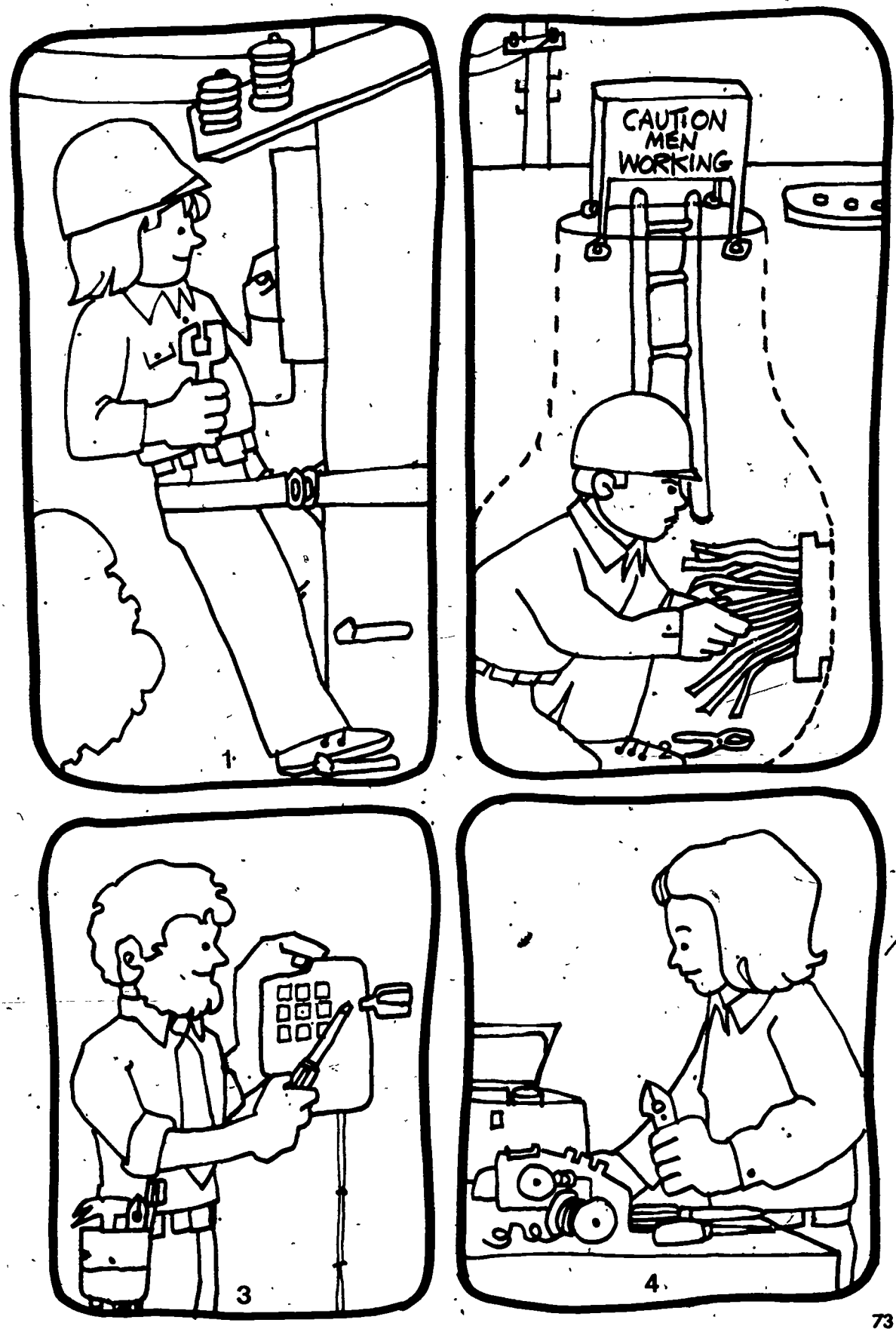
Children should add to their Energy Worker Booklets by writing stories and drawing pictures showing how telephone workers help the community.

Extended Learning Activities

Field trips: Arrange a visit to a nearby telephone company. Help children make a list of things they want to find out in advance of the trip. Invite local telephone companies to send a representative to the school, or send a tele-trainer. Invite a telephone lineman to come to the school to demonstrate his/her interesting specialty.

Resource persons: Invite telephone workers in the community to come to the class to explain their duties and responsibilities.

*The Little Booklet, "Selected Experiments and Projects...from Edison," Thomas Alva Edison Foundation, 18280 West Ten Mile Road, Smithfield, Michigan 48075, 1976, has experiments children can do.


CAUTION
MEN
WORKING
1
3
4

IV. Community Workers Who Make Decisions About Energy

13. Local Government Officials

Overview

This lesson ends the community workers unit on the note that a community must have a variety of goods and services and a body of citizens who work hard to make their community a good place in which to live.

The importance of government and laws is stressed.

Objectives

Students should be able to:

1. Explain that the community is also a place where people exchange ideas.
2. Demonstrate through role-playing how communities meet their problems.

Materials

Government organization picture
Pencils, paper
String
Community worker name tags

Background Information (Teacher use only)

Understanding the term government may be too difficult for second graders. It is to be hoped that an attitude of wanting to do something to help the community in which he or she lives will be developed in each student, that each of us can help to keep our communities clean, law-abiding, and prosperous. The first step in this direction is to take an interest in community affairs, to learn the facts, and to cooperate in better ways of living together.

Teaching Strategies

Motivating learning:

The lesson may be approached by questions that set the tone for the role-playing exercise: A place I know about has many children who have no place to play. The streets are dangerous, and there are no sidewalks. How could we get some playgrounds for the children?

I know of another place that has so much traffic and noise that the people who are sick in the hospital cannot sleep. What could we do to help?

The entire class may react with a lively discussion on the recommendations in regard to such problems as traffic and safety.

Developing the Lesson

Show students the picture entitled "Local Government". Allow enough time for the students to examine it carefully. Ask:

1. Who are the people in the pictures? The students should be able to identify the doctor and the nurse, grocery workers, gasoline station attendant, the teacher, the park ranger, police and fire fighters, and the trash collector.
2. What are the words on the picture? *(Local government.)*
3. What do you think these words mean? *(Answers will vary. Lead the students to discover that they often mean "rule by the people.")*
4. Why are all the people pictured around the words Local Government? How do these people (point to each) relate to government (point to this word)? *(They make up the government.)*
5. Who else could be in the picture? *(Help students toward the understanding that everyone could be pictured.)*

To add some excitement and to help build the concept of participating citizenship, invite the class to get into the picture.

Distribute name tags to ten students who will represent the workers shown in the picture. As you give each child his role tag, say: You are a _____. I want you to think about why you need gasoline to do your job. Repeat with each student-worker. After all roles have been assigned, give the problem to the class:

Our community has only enough gasoline for workers. All the others will have to do without. We need to decide which of the workers will be allowed to buy gasoline, and which will not.

Allow time for each worker to tell why his particular job needs gasoline. After all the speeches have been given, distribute class copies of dittoed pictures. Have the entire class vote by circling

four workers whom they think should be allowed to buy gasoline. Collect the picture "ballots," and have two students tally the votes. One student can announce the names of the workers who received majority votes.

Summary and Evaluation

Hold a class discussion of alternate ways of "solving" the gasoline shortage, emphasizing ways that would allow enough gasoline for all, with everyone having to make do with less. (Car pooling, riding bikes, making fewer trash collections, making fewer car trips, etc., will probably be mentioned.)

Children should complete their Energy Worker Booklets by drawing pictures of people in the community taking part in a decision. Encourage children to show how good citizens make good communities.

Extended Learning Activities

Field trips: Arrange for the class to visit a council meeting or to meet the mayor of your community. Help them make out a list of the things they want to find out. A report to the class may include any words of advice that they received from the persons they talked with.

Resource persons: Any of the following people might be invited to talk to the class: a homemaker, a mayor, an executive secretary of a town council, a council member, and/or a member of a civic association.

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